GUIDE FOR MEAT INSPECTORS

OSTERTAG-WILCOX

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GUIDE

FOR

MEAT INSPECTORS

BY

DR. ROBERT OSTERTAG

WITH 159 ILLUSTRATIONS

AUTHORIZED TRANSLATION

With Numerous Additions and Alterations

BY

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Translator's Preface

At the present time a more active and intelligent interest is taken in meat inspection than ever before. Some years ago our citizens were much exercised over the sensational reports of the inefficiency of meat inspection. As soon as the people began to examine the matter soberly, they found that the initiatory movement for the improvement of inspection had been taken by the Bureau of Animal Industry, that the inspectors were doing their whole duty under the authority which they then had, and that the health of the meat consumer was reasonably well guarded.

Nevertheless, with the passage of the law of June 30, 1906, meat inspection was placed on a better basis. Under the new law the inspector cannot recognize lesions which were previously unrecognizable, nor can he perform his duties more conscientiously than under the old law, but he has authority to enforce sanitary measures where previously he could merely make suggestions. It is in the field of general sanitation of abattoirs and packing rooms that the greatest changes for the better have taken place.

Under the new law it may be rightly asserted that the Bureau of Animal Industry has put in operation the most efficient meat inspection service known to the civilized world. The inspection regulations reflect the most recent advances in our knowledge regarding the effect of animal diseases upon the wholesomeness of meat for food. Only two sanitary qualities of meat are recognized: meat to be passed, and meat to be condemned. Wholesome meat is not condemned, and unwholesome meat is not passed. The interests of both the consumer and producer are thus fully protected.

In translating Ostertag's Handbuch der Fleischbeschau it was felt that a great fund of information on the pathological conditions in meat was made available to the English-speaking inspector. Ostertag soon

realized that a condensed statement of the essentials was needed by the practical inspector. In the various editions of Leitfaden für Fleischbeschauer this idea has ripened to fruition. The descriptive matter is made graphic by the excellent illustrations.

All material not applicable to American conditions has been omitted. About eighty pages relating to German laws, regulations and diseases which do not occur in the United States have thus been replaced with American laws, regulations, educational requirements for inspectors, and matter relating to diseases not discussed by Ostertag.

I am under special obligations to Dr. John R. Mohler, Chief of the Pathological Division of the Bureau of Animal Industry, for revising the translation and making suggestions from his ripe experience. The publishers deserve much credit for their continued active interest in all matters which make for the betterment of the veterinary profession. It is hoped that the present volume may assist both the veterinary inspector and meat inspector in their arduous duties, involving, as they do, not only the highest degree of skill and training, but also the greatest probity and ripeness of judgment.

E. V. WILCOX.

January, 1915.

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Introduction

Nature and Purpose of Antemortem and Postmortem Inspection

Under the term ante-mortem inspection is understood the inspection of living animals before slaughter. The purpose of this inspection is to determine whether animals to be slaughtered are healthy or affected with a disease. By ante-mortem inspection two classes of diseases may be detected:

1. Diseases which are of influence upon the wholesomeness of the meat.
2. Infectious diseases or plagues of veterinary interest.

Furthermore, ante-mortem inspection has the purpose of rendering post-mortem inspection easier. If animals intended for slaughter show no symptoms of disease, the more minute inspection of certain parts, e.g., bones and articulations, may be omitted. On the other hand, in the case of diseased animals ante-mortem inspection gives an indication of the parts which are to be especially considered post mortem. For further details see the special chapter on ante-mortem inspection (Chapter IV).

Post-mortem inspection, or meat inspection, is the investigation of slaughtered animals. It has the same function as ante-mortem inspection.

Ante-mortem and post-mortem inspection are often considered collectively as meat inspection.

In judging the fitness of meat for food ante-mortem inspection is of great importance for the reason that there are diseases which can be more accurately diagnosed in the living than in the dead animal.

The maintenance of ante-mortem and post-mortem inspection is necessary:

1. Since diseases may be transmitted to man through the consumption of meat.
2. And since animal plagues may be disseminated through the sale of diseased meat.

Thus meat inspection has both a medical and veterinary bearing.

II

Name and Normal Character of Organs and Parts of Animals, Including the Determination of the Species from Sample Parts

The body of food animals is composed of:

1. The skeleton.
2. The muscles, ligaments, tendons and sheaths of tendons.
3. Various viscera or organs naturally grouped together into the respiratory, digestive, urinogenital, nervous, circulatory and lymphatic systems.
4. The skin or general integument.

1. The Skeleton

The skeleton consists of the bones of the head, body and extremities (Figs. 1 and 2).

Among the bones of the skull we may distinguish the cranial bones, forming the cranial cavity, and the facial bones, forming the nasal, mandibular and mouth cavities. The cranial cavity encloses the brain and the mouth cavity the tongue. Of the skull bones special mention may be made of the frontal bone covering the fore part of the brain, and the occipital bone enclosing the brain behind.

The more important facial bones are the nasal bones, which enclose the nasal cavity, the jawbones, which bear the teeth in their special alveoli, and the palatine bones, which separate the nasal and mouth cavities.

The bones of the trunk include the vertebræ, ribs and sternum. The vertebral column is divided into the cervical, dorsal, lumbar, sacral and caudal regions. The vertebræ enclose a canal which is a continuation of the brain cavity and contains the spinal cord. The ribs with

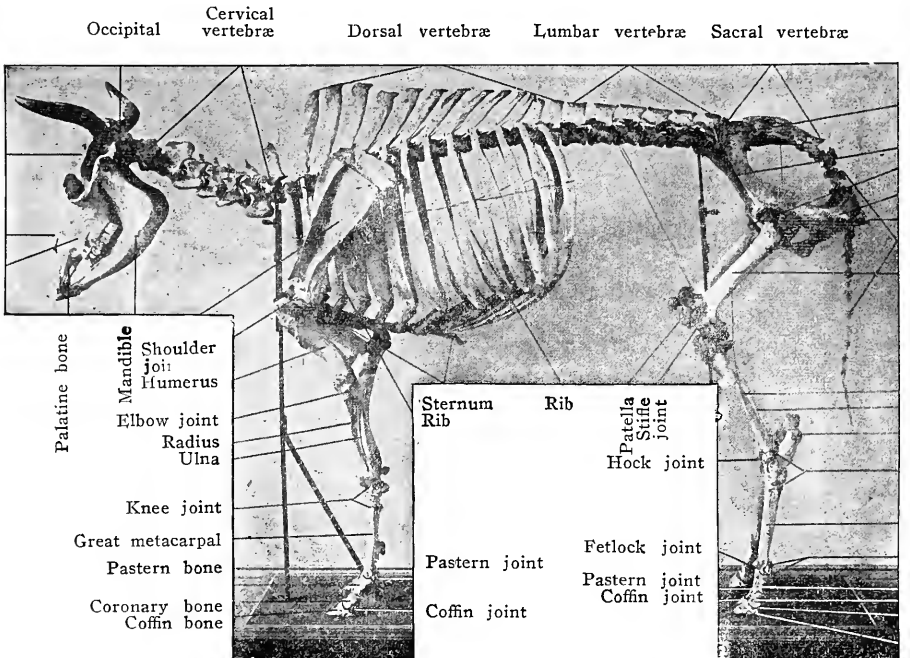


Fig. 1.—Bovine skeleton.

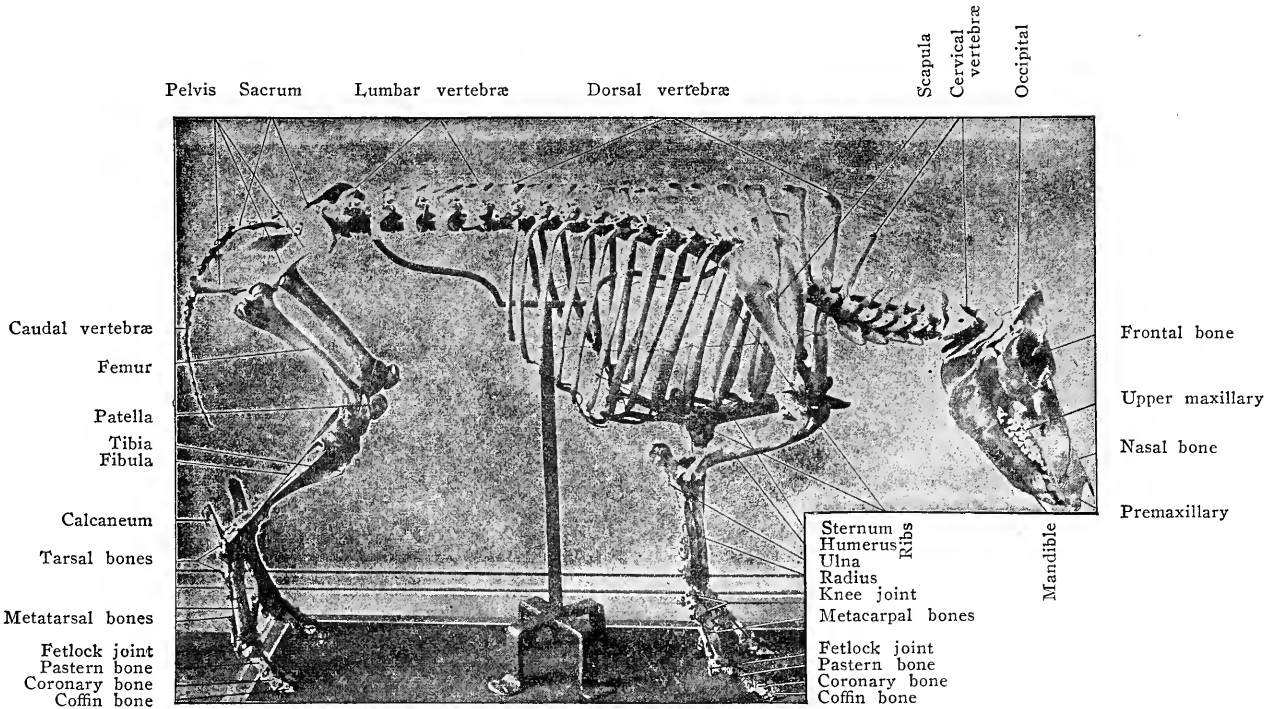


Fig. 2.—Skeleton of swine.

the dorsal vertebræ and sternum form the thorax or bony framework of the thoracic cavity. The lungs and heart lie in this cavity.

The appendicular skeleton includes the anterior and posterior extremities and their girdles.

The pectoral limb consists of a scapula, humerus, radius, ulna, metacarpals, and digits, which in turn include the metacarpal and phalangeal bones (pastern, coronary, coffin and sesamoid bones). The pelvic limb consists of the pelvis (ilium, pubis and ischium), femur, tibia, fibula and other distal parts as in the pectoral limb.

The above-mentioned bones are either flat like the scapula and ribs, or long and tubular like the humerus, femur and tibia. The flat bones contain a red pomacelike material in the interior, the tubular bones a so-called marrow cavity in which the bone marrow is found.

Differentiation between the bones of different food animals. The bones of the different food animals possess peculiar characteristics by means of which the species may be distinguished. A knowledge of these distinguishing points, however, presupposes a close familiarity with osteology such as is not usually furnished in the training of the non-veterinary inspector. If in special cases it is necessary to determine the origin of meat from the characteristics of the bones, this matter may be referred to a veterinary inspector.

Articulation of the bones. Bones are articulated with one another in various ways, by sutures as in the bones of the skull, by cartilaginous discs as in the vertebræ, or by joints as in the limbs. In the formation of joints not only the ends of the bones but also the articular ligaments are concerned.

2. Muscles

The bones serve as attachment for the muscles. Muscles have an attachment upon one bone and an insertion upon another (Fig. 3). At the point of attachment the muscles pass over into shorter or longer tendinous fibers, particularly long in the case of the limb muscles. The tendons are surrounded with sheaths.

The muscles which are attached to bones are known as skeletal muscles. They are also called striated muscles for the reason that

under the microscope they disclose a cross striation (Fig. 4). The so-called smooth muscles in the wall of the stomach and alimentary tract have smooth, non-striated fibers (Fig. 5).

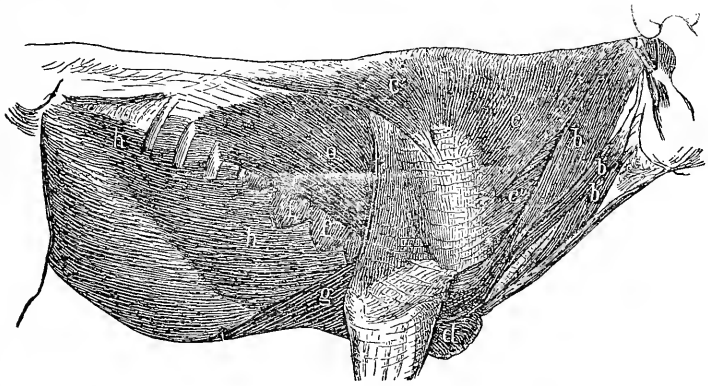


Fig. 3.—Superficial muscles on the neck, anterior extremities, chest and abdomen of an ox.

The muscles are bound into large groups by means of the so-called connective tissue. In fat animals this connective tissue becomes trans-

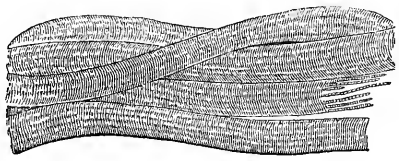


Fig. 4.—Striated muscle fibers.

formed into adipose tissue. The stronger the development of fat tissue the higher the degree of fattening in food animals. The fat

Fig. 5.—Smooth muscle fibers.

tissue also covers over the prominent parts of bones. Fat animals may thus be recognized before slaughter by the slight prominence of the bones.

Characteristics of the musculature, including the corresponding fat tissue, connective tissue, bones and joints in food animals. After slaughter the muscle, fat and connective tissue are almost free from blood. In cattle the fat tissue is white or pale reddish, firm, and showing wavy or grapelike prominences on the surface. The tallow of animals from pastures or of old cows may be yellowish. The bones possess a thick, firm, grayish white or grayish yellow cortical layer. The bone marrow is firm and pure white or reddish yellow. The fat tissue of sheep and goats is white and firm; that of hogs white, finely granular and soft. The musculature in young cattle is pale red, in sucking calves light or dark grayish red, in bulls dark red, in steers bright red, in cows bright or dark red, in sheep light red, in swine pale or grayish red. The meat of older animals is usually darker.

In poor animals there is little fat tissue, but, in contrast with the fat tissue of animals emaciated as the result of disease, it is firm, not tough, neither moist nor gelatinous. The muscles of non-emaciated animals feel full and elastic, never soft or flabby.

3. Viscera

(a) *Respiratory Apparatus*

The respiratory apparatus (Figs. 6 and 7) includes the nasal cavities, larynx, trachea and lungs.

The nasal cavities are separated by a septum (Fig. 6, *a*), and, like the larynx and trachea, furnished with a mucous membrane, which is smooth and in healthy animals moistened with a small quantity of watery mucus.

The framework of the larynx is formed by the laryngeal cartilages (Fig. 6, *c*), to which the laryngeal muscles are attached.

Between the nasal cavities and the larynx lies the nasopharyngeal space (Fig. 6, *b*).

The trachea (Fig. 6, *d*) consists of a large number of cartilaginous rings which are connected with one another by ligaments. At the entrance into the lungs the trachea divides into two large branches, similar to the trachea in structure, and these branches in turn repeat-

edly ramify into bronchioles which are gradually lost in the pulmonary tissue.

The lungs (Fig. 6, *h*, and Fig. 7) are composed of left and right halves which in turn exhibit smaller parts or lobes. The pulmonary lymph glands are found at the point of entrance of the trachea (Fig. 7). Healthy lungs collapse after removal from the thorax. In animals which have been well bled during slaughter they have a yellowish rose red color, later becoming dark red, and a smooth, shining surface. If the lungs are incised and a knife is passed over the cut surfaces a white or reddish fluid mixed with air bubbles is

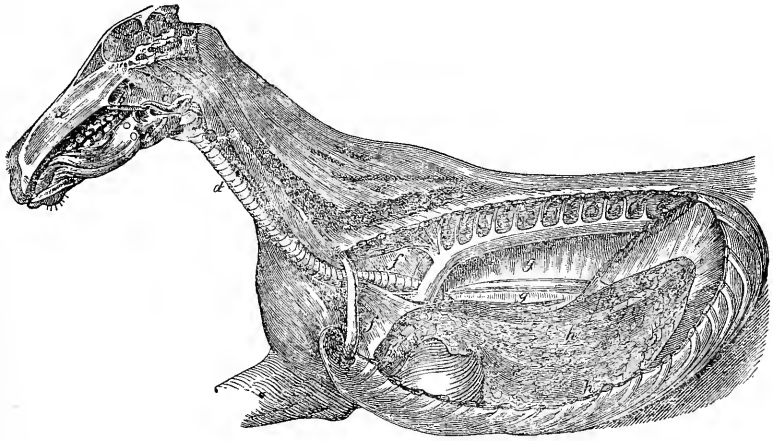


Fig. 6.—Respiratory apparatus. (After Franck.)

a- nasal septum, *b*- nasopharyngeal space, *c*- larynx, *d*- trachea, *e*- thyroid gland, *f*- and *g*- mediastinum, *h*- left lung. The posterior end of the lung lies upon the diaphragm.

observed. A similar foam is found in the air passages. The lungs feel soft-elastic, i.e., they are readily indented by the finger but the pits quickly disappear after removing the pressure. A piece of lung thrown in water will float. The lungs are covered with a smooth, thin, shining and transparent membrane, the pulmonary pleura. The folds unite between the two halves of the lung into the so-called mediastinum (Fig. 6, *g*), which passes upward between the lungs to the vertebral column. In the mediastinum are found the mediastinal glands (Fig. 7). The mediastinum is attached to the vertebræ and

passes downward from this point as the costal pleura covering the inner surface of the thorax, ribs, sternum and diaphragm, which latter separates the thoracic from the abdominal cavity. The pul-

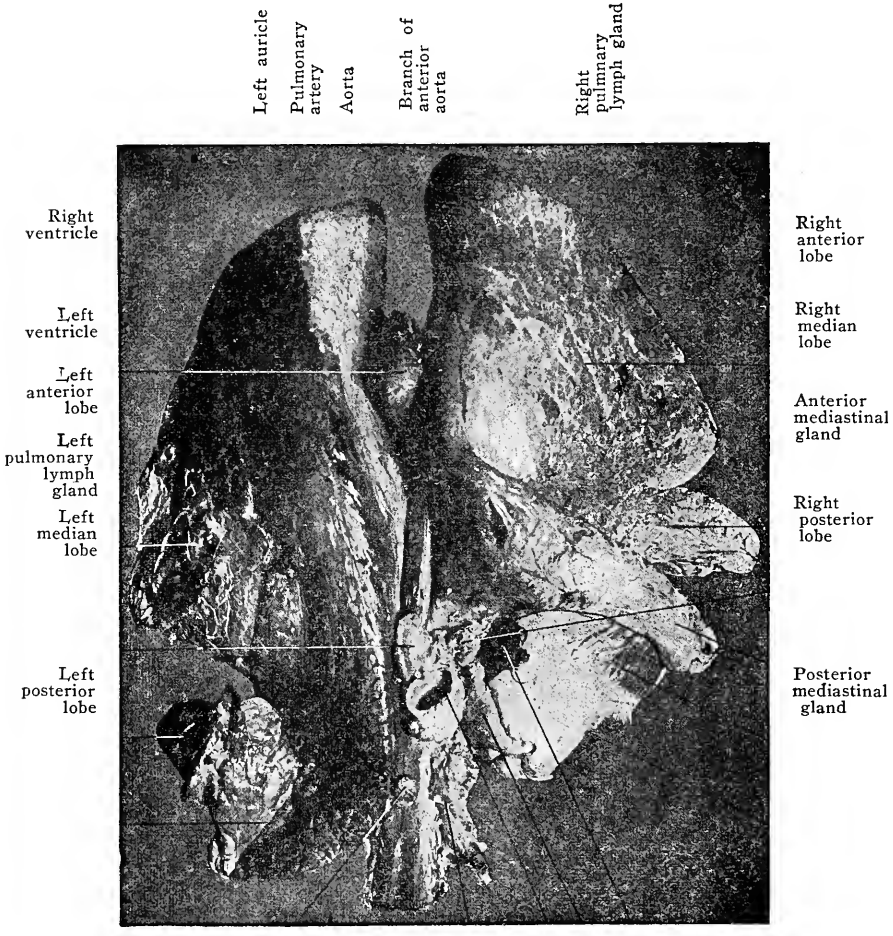


Fig. 7.—Bovine lungs and heart.

monary pleura and the costal pleura together constitute the thoracic pleura.

Differentiation of the lungs of different food animals. The lungs of ruminants (cattle, sheep and goats) possess two or three lobes on

the left and four or five on the right. Beef lungs show a further division of the lobes into small lobules, the latter being separated by a strongly developed interstitial tissue (Fig. 7). Hog lungs have two or three lobes on the left and three or four on the right.

(b) *Digestive Apparatus*

The digestive apparatus consists of the teeth and tongue in the mouth cavity, the pharynx surrounding the pharyngeal cavity, the esophagus, stomach, intestines and intestinal glands including the salivary glands, liver and pancreas.

The age of animals may be determined by the character of the teeth (see age determination).

The tongue is a muscular organ covered with a thick, opaque, white mucous membrane. Distinction is made between the basal and apical parts of the tongue.

Differentiation of the tongue of different food animals. The beef tongue has a strong dorsal ridge, a slender tip, and, upon the latter, numerous spinelike, backwardly directed papillæ, which when stroked with the hand feel like a stiff brush. On the dorsal ridge of the beef tongue there are on either side twelve circumvallate papillæ (Fig. 8). In sheep and goats the tongue is notched in the middle of the tip. Papillæ are wanting on the tip. In black sheep the tongue is always black or spotted with black. The dorsal ridge is wanting in the tongue of the hog. The sharp-pointed papillæ are likewise wanting and in their place are found slender, filiform and round papillæ. The hog tongue has only two circumvallate papillæ on either side (Fig. 9).

Cattle, sheep and goats have incisors only in the lower jaw and not in the upper jaw as in swine.

The mouth cavity, like all other parts of the digestive apparatus, is covered with a mucous membrane which is smooth and moist. That part of the mucous membrane which covers the palatine bones is called the hard palate, the part which separates the pharynx from the mouth cavity is called the soft palate, and the part which covers the cheeks and lips is called the buccal and labial mucosa.

The stomach is a sacklike enlargement of the digestive canal. The intestine is a tube of varying size and length with a number of

Fig. 8.—Bovine head and tongue.

different parts. We distinguish between the small and large intestines. The small intestine begins at the stomach, the large intestine

ends at the anus. Between the small and large intestine there is a constriction, the iliocecal valve. The large intestine is further divided into cecum, colon and rectum (Figs. 10 to 13).

The stomach and intestine lie in the abdominal cavity and are held in position by ligaments. They are covered by a smooth, shining membrane, the peritoneum. Beneath this is a muscular coat and upon the inside a mucous membrane. The muscular coat consists of so-called smooth muscle fibers which show no cross striation (Fig. 5).

Fig. 9.—Tongue with pharynx and larynx of the swine.

The mucous membrane of the stomach and intestine contains the digestive glands which secrete the digestive juices. Furthermore, minute lymph glands or lymph follicles are found in the mucosa of the intestine.

The stomach and intestine of healthy animals always contain more or less material after slaughter. Externally the stomach and intestine are whitish or bluish gray. The mucosa is smooth or

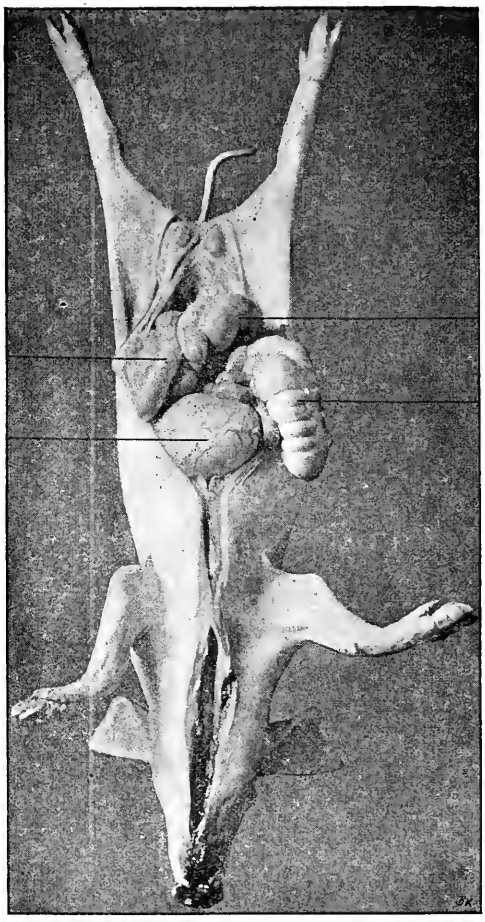


Fig. 10.—Stomach and intestines of swine after incomplete opening of the abdomen.

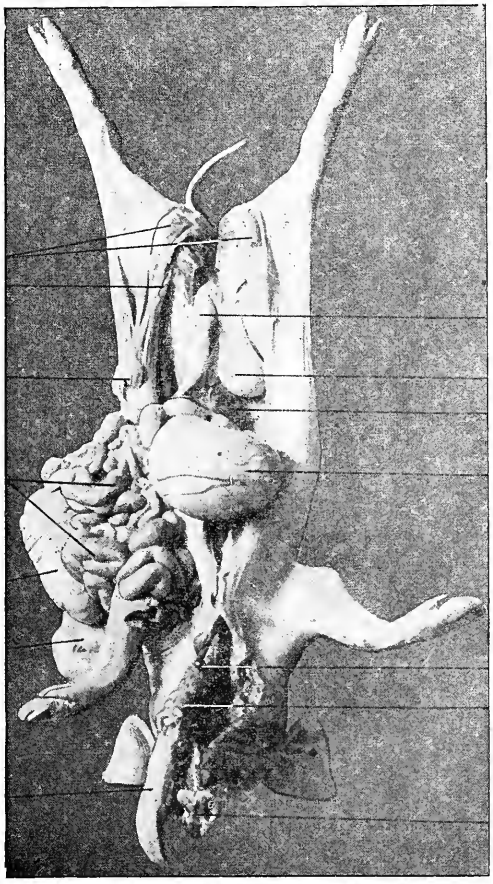


Fig. 11.—Stomach and intestine of swine after complete opening of the abdomen.

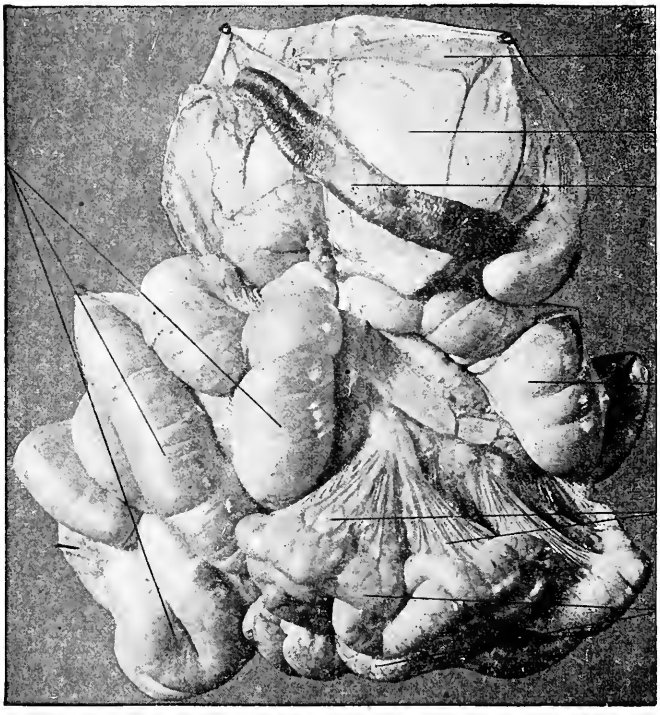


Fig. 12.—Exenterated stomach, intestine and spleen of swine.

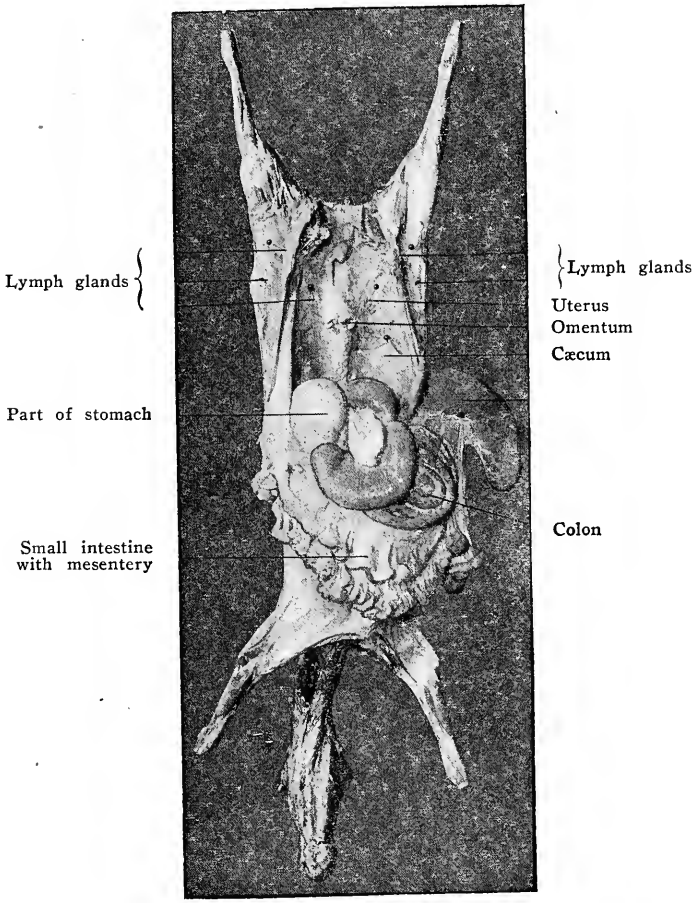


Fig. 13.—Alimentary canal of sheep after opening abdomen.

velvety, slippery and, with the exception of one place in the stomach, gray or grayish yellow and shining. In the mucosa of the stomach there is one point which is red even in healthy animals. In hogs this point lies in the floor of the stomach at the lowest part of the large curvature. At this point the mucosa is brownish red, and bluish red during gastric digestion.

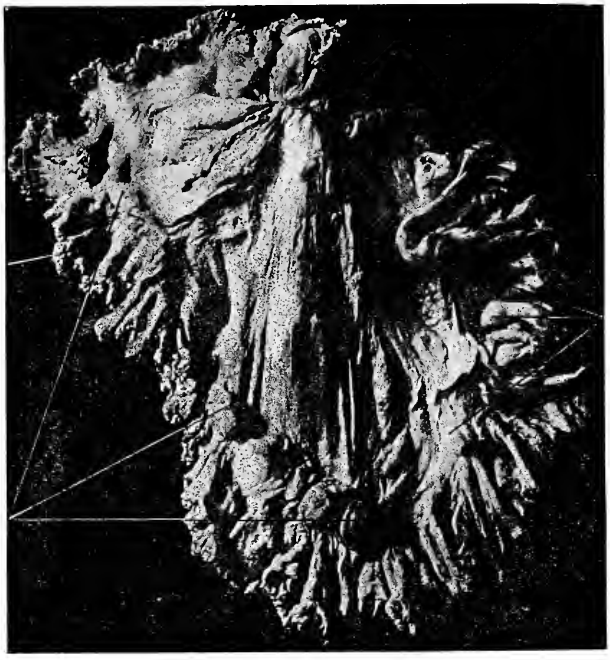


Fig. 14.—Mesentery of a fat steer.

The membrane which covers the alimentary tract unites to form the so-called mesentery. In the mesentery are found the mesenteric glands, and in addition in fat animals a strongly developed adipose tissue (Figs. 12 to 14). The mesentery supports the alimentary tract by attachment to the vertebral column, from which point it passes over the abdominal wall, thus forming the inner lining of the abdominal cavity or parietal layer of the peritoneum.

One part of the peritoneum, known as the omentum, surrounds the stomach and intestine as a netlike membrane (Figs. 10 to 13). In fattened animals fat accumulates in the omentum, rendering it cloudy and streaked or entirely opaque.

Differentiation of the stomach of different food animals. In cattle, sheep and goats the stomach has four parts, three forestomachs (rumen, reticulum and psalter) and a true or digestive stomach (Figs. 15 and 16). The stomach of the hog is simple.

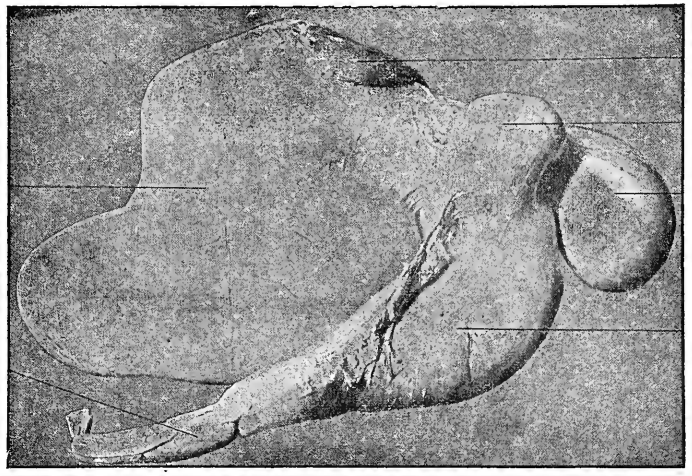


Fig. 15.—Stomach and spleen of ruminant.

The liver is a large glandular organ which lies behind the diaphragm and is connected with the latter by ligaments. There is an anterior or diaphragmatic surface and a posterior or gastric surface. The porta hepatis or entrance for the portal vein is on the posterior surface and about this structure are arranged the hepatic lymph glands (Fig. 18). The liver is of a reddish brown color, has sharp borders, feels firm but yielding, and exhibits numerous small

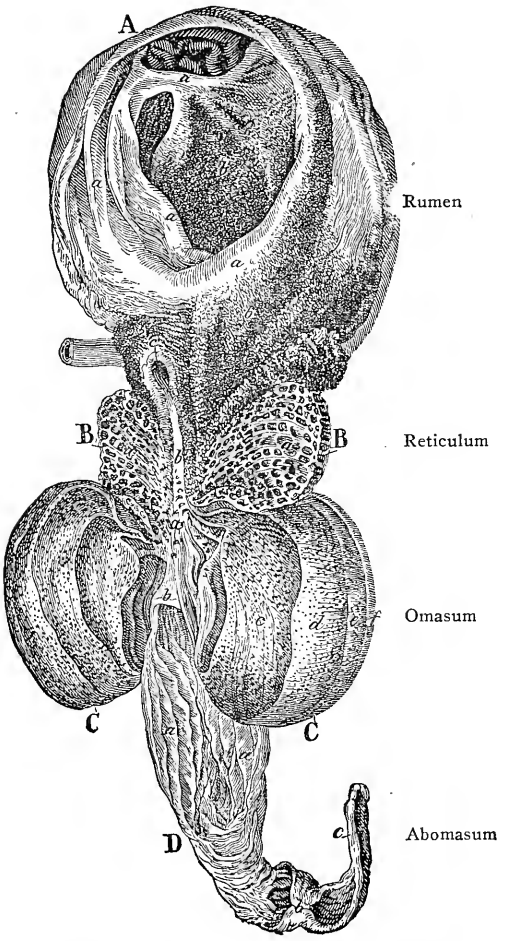


Fig. 16.—Opened stomach of ruminant. (After Franck.)

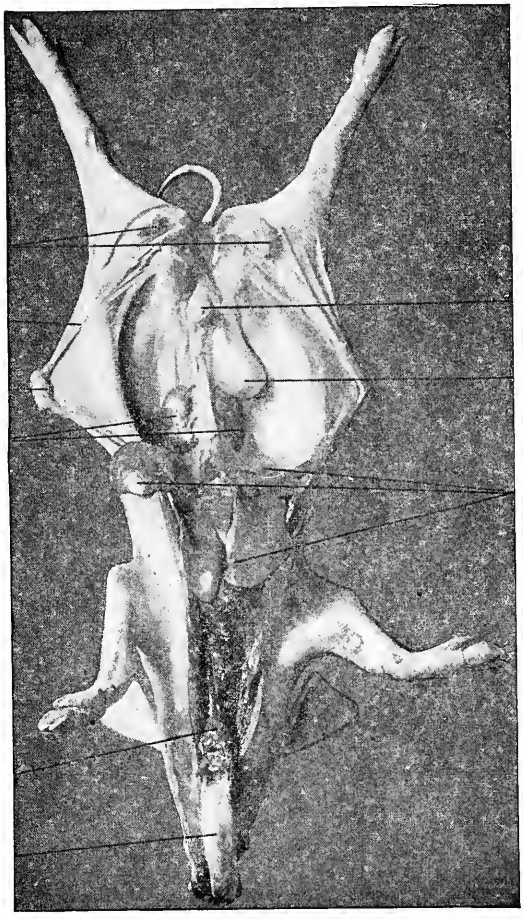


Fig 17.—Liver of hog in natural connection with diaphragm, also urinogenital organs in natural position.

lobules, the hepatic lobules (Fig. 20). In fattened animals the liver may show a yellowish brown color and rounded borders.

The liver secretes the bile which passes through the bile ducts into the gall bladder, where it collects and finally empties into the intestine through the hepatic bile duct.

Differentiation of the liver of different food animals. The beef

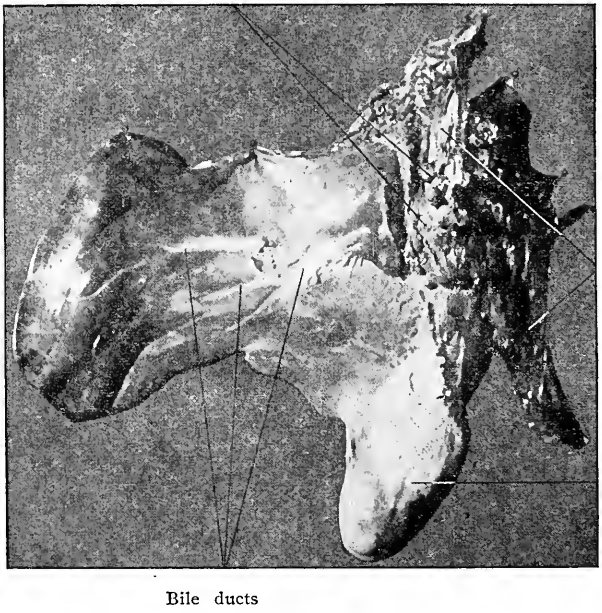


Fig. 18.—Gastric surface of bovine liver with pancreas.

liver is two-lobed and has a strongly developed additional lobe, the so-called Spigelian lobe (Figs. 18 and 19). In sheep and goats the liver also has two lobes. The liver of hogs, on the other hand, possesses four lobes (Fig. 17) and also a small Spigelian lobe. Furthermore, in the hog liver the hepatic lobules are conspicuous (Fig. 20).

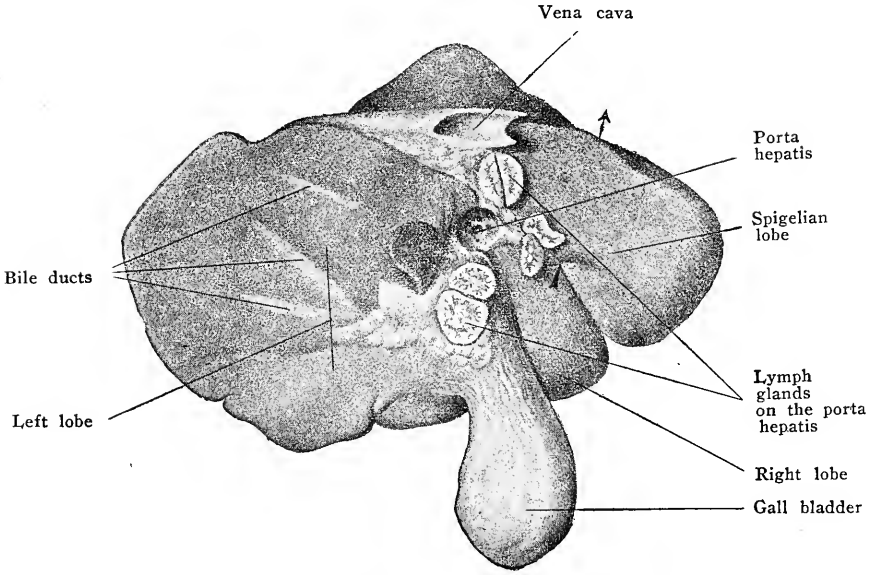


Fig. 19.—Gastric surface of bovine liver after removal of pancreas.

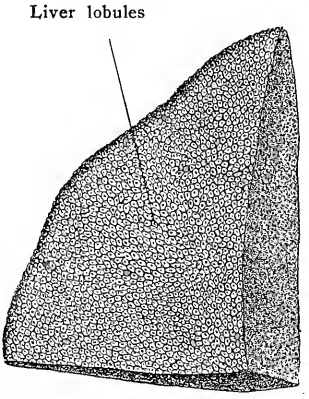


Fig. 20.—Piece of swine liver showing lobules.

The salivary glands in the head and the pancreas connected with the intestine and liver (Fig. 18) are gray or grayish yellow lobular structures. They secrete the saliva and pancreatic juice, which are mixed directly with the food, or, as in the case of the pancreas, conducted through a special duct into the intestine.

(c) *Genito-urinary Apparatus*

The urinary apparatus consists of the kidneys, ureters, bladder and urethra.

In all animals there are two kidneys, a right and left (Fig. 17). The kidneys lie beneath the vertebral column. They are surrounded

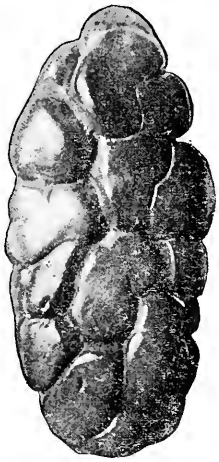


Fig. 21.—Bovine kidney.

with a special capsule, the renal capsule, which in fattened animals contains a strongly developed fat tissue. The renal capsule must be removed before the kidneys can be seen. They exhibit a reddish brown color on the surface and minute red spots on the surface as well as in the outer part of the cortical layer (Fig. 25). The kidneys possess a firm consistency. The surface of the exterior and of sec-

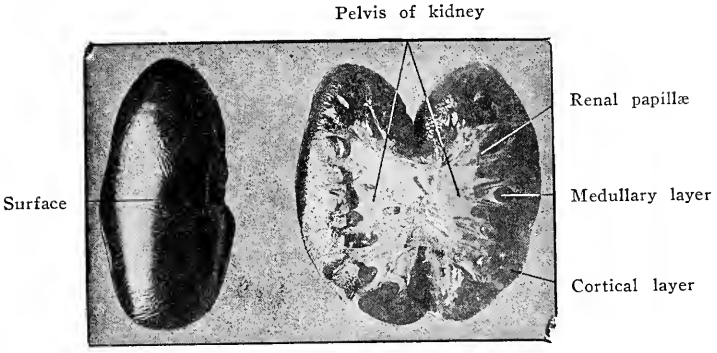


Fig. 22.—Kidney of swine. (Surface and section.)

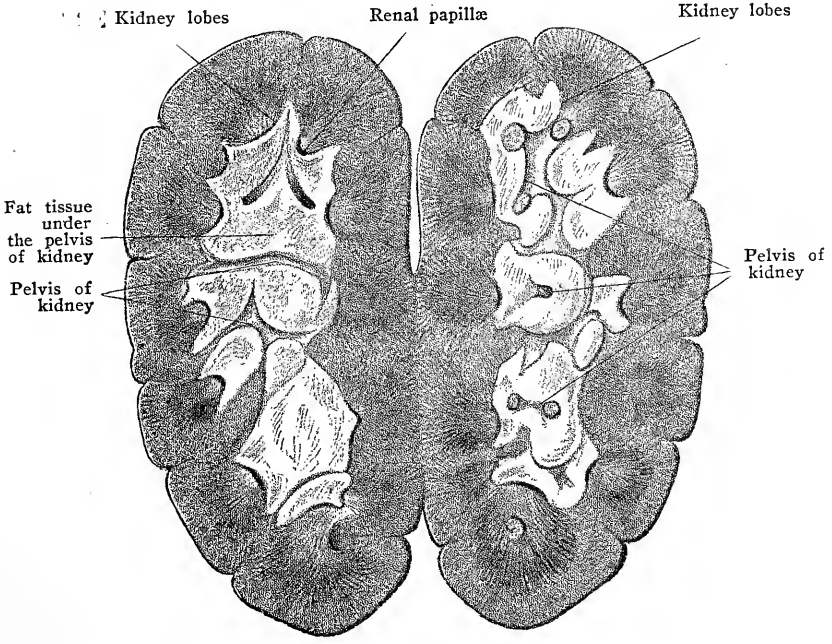


Fig. 23.—Bovine kidney. (Sectioned.)

tions is smooth and shining. In highly fattened hogs, and more rarely in cattle and sheep, the kidneys may be yellowish brown and cloudy in appearance.

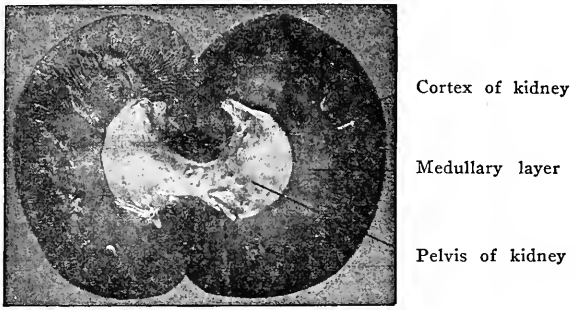


Fig. 24.—Kidney of sheep. (Sectioned.)

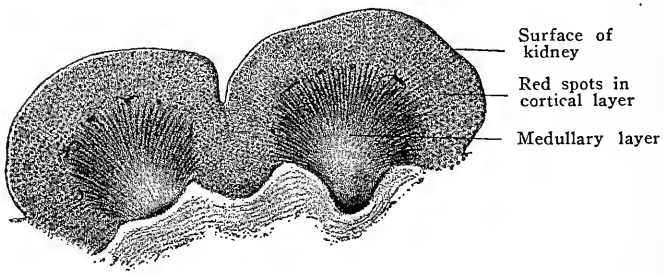


Fig. 25.—Section through two renal lobules of the steer.

The kidneys excrete the urine which first collects in a cavity of the kidneys known as the renal pelvis (Fig. 23). From here the urine passes through the ureters to the urinary bladder, and from the bladder through the urethra to the outside (Fig. 17).

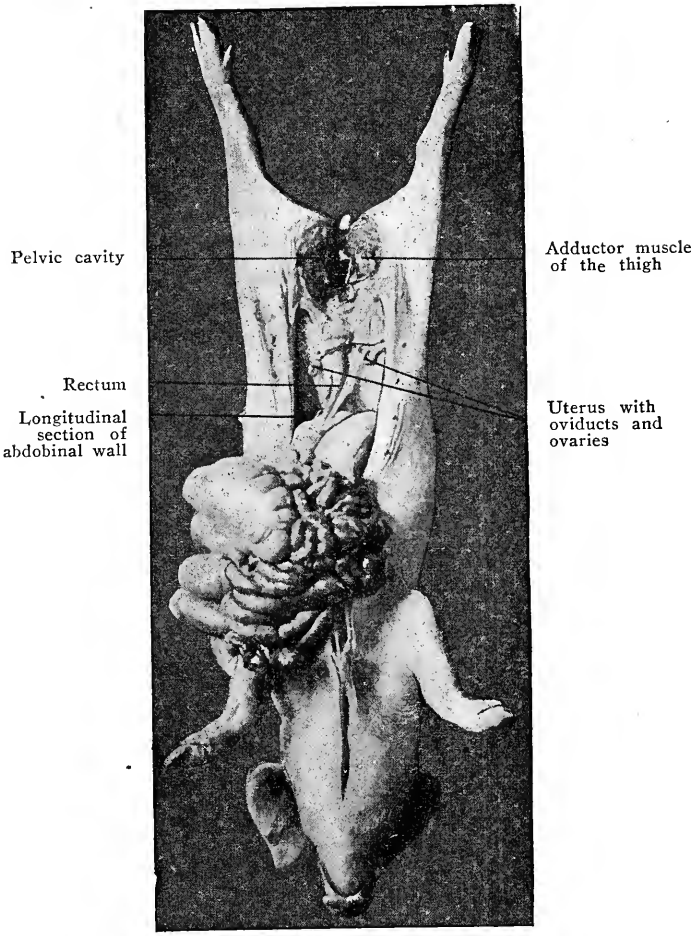


Fig. 26.—Sow after opening abdominal and pelvic cavities.

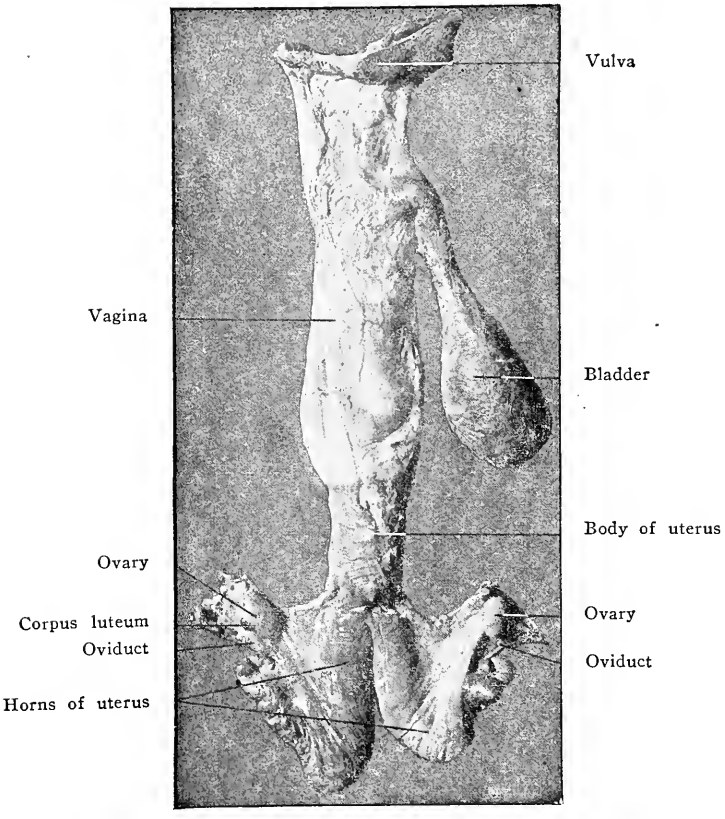


Fig. 27.—Outer surface of reproductive organs of cow.

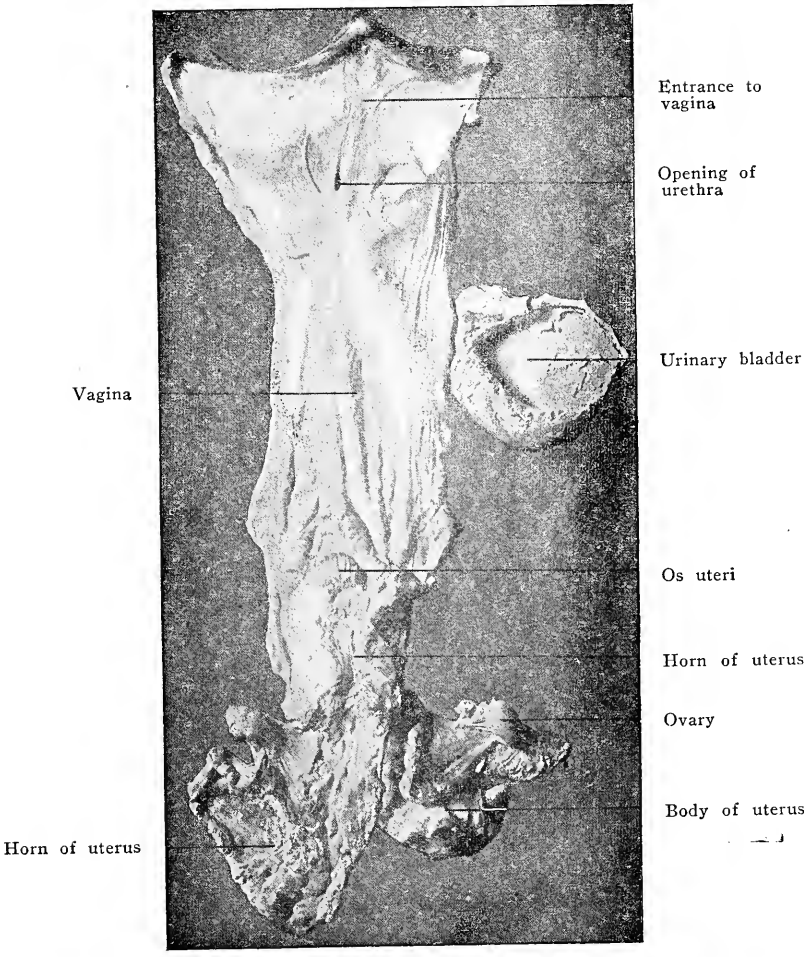


Fig. 28.—Mucous surfaces of bovine vulva, vagina, uterus and bladder.

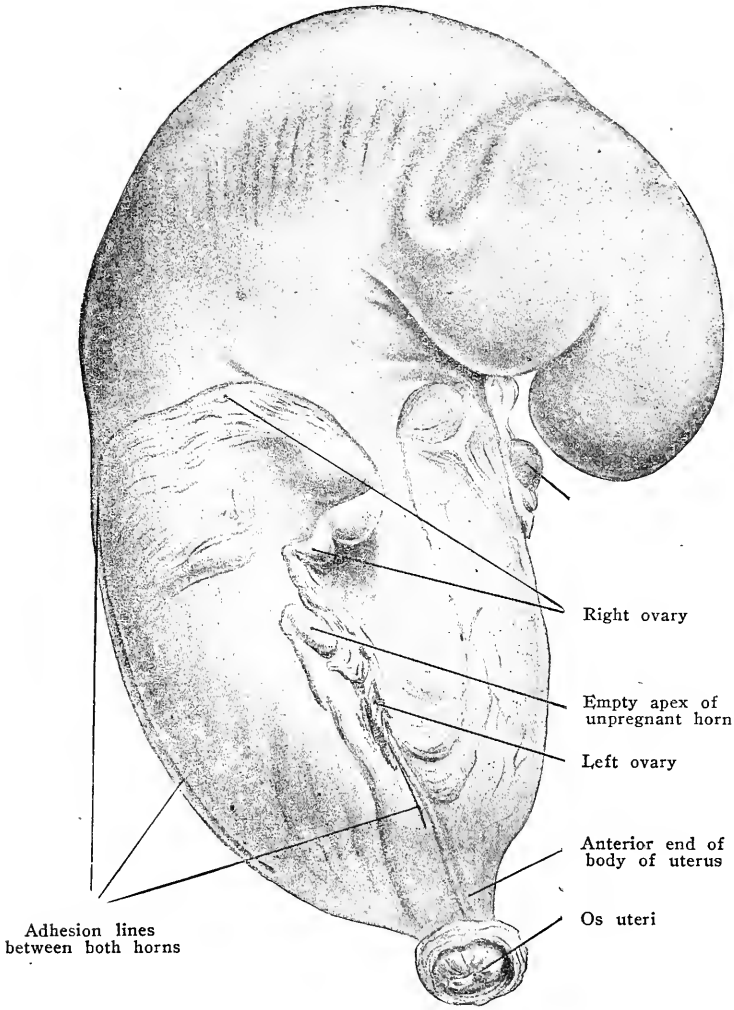


Fig. 29.—Pregnant uterus of cow. (Harms.)

Differentiation of the kidneys of different food animals. The beef kidneys are oval and lobular, consisting of 15 to 25 lobules of varying size (Fig. 21). In sheep and goats the kidneys are bean-shaped and without lobes. Only one papillary process, the renal papilla,

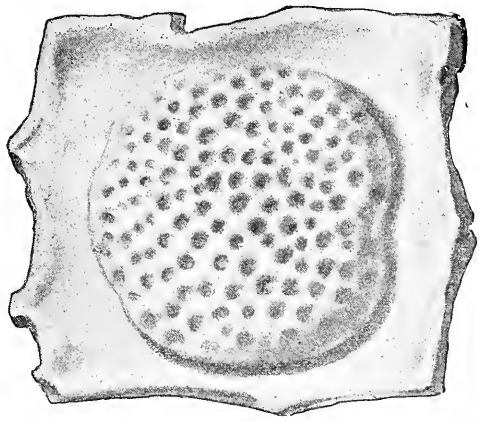


Fig. 30.—Uterine cotyledon of the cow. (Harms.)

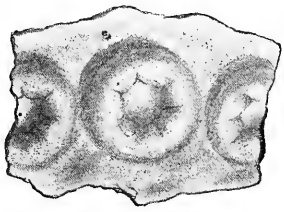


Fig. 31.—Uterine cotyledons of the ewe.

empties into the pelvis of the kidneys of sheep and goats (Fig. 24). The kidneys of the hog are likewise bean-shaped and without lobes, but they show 6 to 11 renal papillæ on cross-section, and are longer and thinner than the kidneys of sheep and goats.

The male sexual apparatus consists of the testicles which lie in the scrotum and produce the semen (Fig. 17), the seminal vesicle and penis composed of urethra and corpora cavernosa (Fig. 17).

In male animals the urethra is attached to the ischium by the ischiocavernosus muscle. In slaughtering the stump of this muscle remains attached to the ischium and may be used in determining the sex of the animal carcass. In boars the preputial sheath lying at the anterior end of the urethra is removed with the latter (Fig. 17), thus producing in the lower abdominal wall a cut which is wanting in female animals (Fig. 26).

The female sexual apparatus consists of the ovaries, oviducts, uterus, vagina, vulva and udder.

The ovaries are connected with the uterus by means of the oviducts. The ovaries are oval structures on which vesicles with watery contents and yellow nodules (corpus luteum) are to be seen (Fig. 27). In healthy animals the oviducts are not very prominent.

The uterus is a membranous sack lying partly in the pelvic cavity and partly in the abdominal cavity. The surface color is grayish white or grayish red. The uterus has a body and two horns (Fig. 27). The horns are covered with the peritoneum and are composed of a thick layer of smooth muscle fibers and a mucosa. This mucous membrane is yellowish or reddish gray and possesses the peculiar property of forming buttonlike structures or uterine cotyledons in pregnant cattle, sheep and goats (Figs. 30 and 31). In nonpregnant cows there are mere folds of the mucous membrane in the place of the uterine cotyledons (Fig. 28). At the vaginal end the uterus is closed by the os uteri (Fig. 29).

In cattle, sheep and goats the udder is located between the thighs in the pubic region, in swine on the lower thoracic and abdominal wall. In animals which have not borne young the udder is firm and only slightly developed. In animals which have borne young, however, it is large and soft. In animals which for a long period before slaughter have not been milked nor sucked the milk in the udder and milk cisterns may coagulate into small white masses. In the case of sucking brood animals milk may be pressed out of the udder.

(d) *The Nervous System*

The nervous system consists of the brain, medulla oblongata and spinal cord. The two chief parts of the brain are the cerebrum and cerebellum (Fig. 32). The nerves arise from the brain and spinal

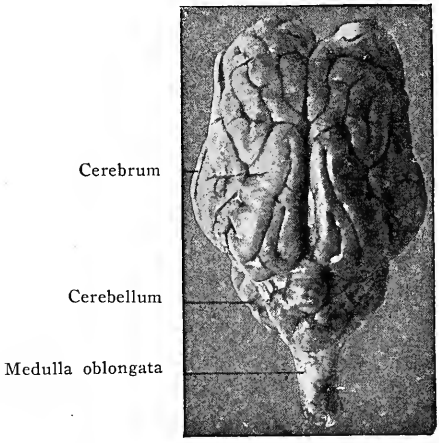


Fig. 32.—Bovine brain and bulb.

cord. They are white flat structures, becoming smaller and smaller as the distance increases from the point of origin, and finally dividing into small fibers invisible to the naked eye.

(e) *Circulatory Apparatus*

The circulatory apparatus consists of the heart and blood vessels. The heart is a muscular organ with four chambers (a right and left ventricle and a right and left auricle). The walls of these chambers consist of the myocardium or cardiac musculature, which is covered with a smooth, glistening membrane (the endocardium on the inside and the epicardium on the outside). The heart is surrounded by a membranous sack, the pericardium, which contains a small quantity —at most a teaspoonful—of a clear, colorless and odorless fluid. The inner surface of the pericardium is smooth and glistening, and lies loosely upon the surface of the heart. The two sides of the

heart are separated by a longitudinal septum, while the auricles are separated from the ventricles by the cardiac valves.

From the heart arise the efferent vessels or arteries which carry the blood to all parts of the body. The arteries finally become subdivided into minute capillaries invisible to the naked eye (Fig. 35). These capillaries reunite into larger afferent vessels, the veins which return the blood from all parts of the body to the heart (greater or

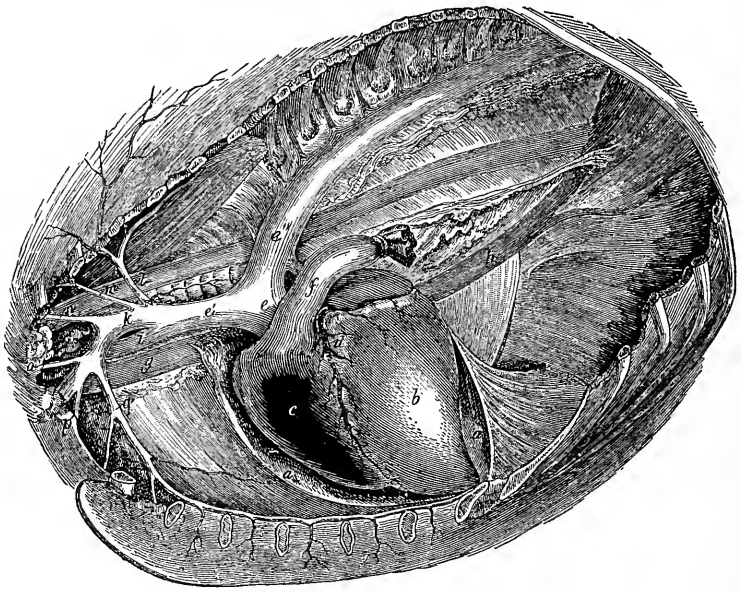


Fig. 33.—Heart, pericardium and vessels in natural position. (After Franck.) *a*- pericardium, *b*- left ventricle, *c*- right ventricle, *d*- coronary artery, *e*- aorta with its branches, *f*- pulmonary artery, *g*- and *h*- anterior and posterior vena cava.

systemic blood circulation, Figs. 35 and 47). After being brought back from the body to the heart through the veins the blood is forced by the heart into the lungs, from which, after passing through the pulmonary capillaries, it is returned to the heart (pulmonary circulation, Figs. 34 and 47). The pulmonary is also called the lesser circulation. The portal circulation is another lesser circulation.

Thus the circulatory apparatus forms a system of closed tubes

which are in organic connection and in which in the living animal the blood is kept constantly flowing. The course of the blood is as follows: From the left ventricle the blood is driven through the aorta

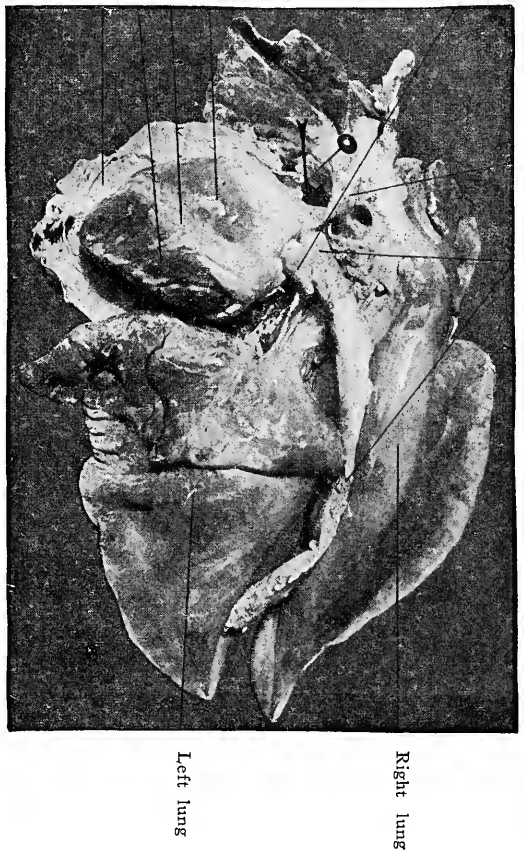


Fig. 34.—Heart with connecting vessels and in natural connection with the lungs.

and its ramifications into the various parts of the body. Here it is collected in the veins and returned to the right auricle through the vena cava (systemic circulation). From the right auricle the blood

passes into the right ventricle and thence into the lungs. From the lungs it returns to the left auricle and thence to the left ventricle (pulmonary circulation). The portal circulation begins with veins which arise from the stomach, intestine and pancreas and which unite into the portal vein. The portal vein empties into the liver at the porta hepatis and breaks up into capillaries. From these capillaries the blood is collected and poured into the systemic circulation through the hepatic vein (Fig. 47).

Form of the heart. The heart consists of cross striated muscle fibers like those of the skeletal musculature. When the heart is contracted it has a conical form. In diastole, however, it is more spherical. In slaughtered animals the heart usually has the conical form.

The cardiac muscle has a reddish brown color, conspicuous sheen and a firm consistency, especially in the left ventricle. In slaughtered animals which have been well bled very little blood is seen on a cross-section of the heart muscle or in the severed blood vessels. A strikingly small blood content is also to be noted in the coronary vessels which lie in the coronary grooves of the heart surface and which in fattened animals are surrounded by a white or yellowish white fat tissue (Fig. 34). The cardiac valves are thin membranous structures which may show small nodular thickenings on the borders.

Differentiation between the beef heart and that of other food animals. Aside from its greater size the beef heart possesses two bones in the aorta which carries blood from the left ventricle to the body. In the heart of other food animals no such bones are present.

The blood. In slaughtering, the circulatory system becomes empty as a result of severing the vessels in the neck. In slaughtered animals which have been well bled the vessels are quite empty except for small traces of blood. In well-bled carcasses it is only in the heart that small blood clots can be found. In well-bled carcasses no blood except in mere traces is found on cross-sectioning the liver or muscles.

Recognition of animals which have died a natural death. In animals which have died a natural death the blood collects in the side upon which the animal lay at the time of death (blood hypostasis). One side is therefore colored dark red by the blood while the other side is free from blood as in slaughtered animals. In all of the

paired organs or organs which are divided into a right and left half, one organ or one half in animals which have died a natural death is always full of blood and dark colored.

In the vessels the blood is fluid. After removal from the vessels it soon coagulates into blood cakes. Coagulation may be prevented by stirring the blood with the hand or otherwise. The blood of healthy animals colors the hands bright red.

(f) *Lymphatic System*

The lymphatic system is closely connected with the blood system. The lymph originates from the blood in the capillaries in the various

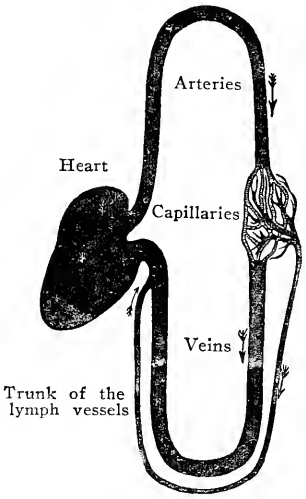


Fig. 35.—Diagram of the relationship between the blood and lymph vessels. (After Martin.)

parts of the body, and is carried back to the blood system by means of the lymph vessels (Fig. 35). The lymphatic system is composed of lymph vessels and lymph glands.

The lymph vessels are smaller or larger tubes formed of delicate thin membranes and as a rule are not recognizable without special preparation. The lymph vessels arise in various parts of the body,

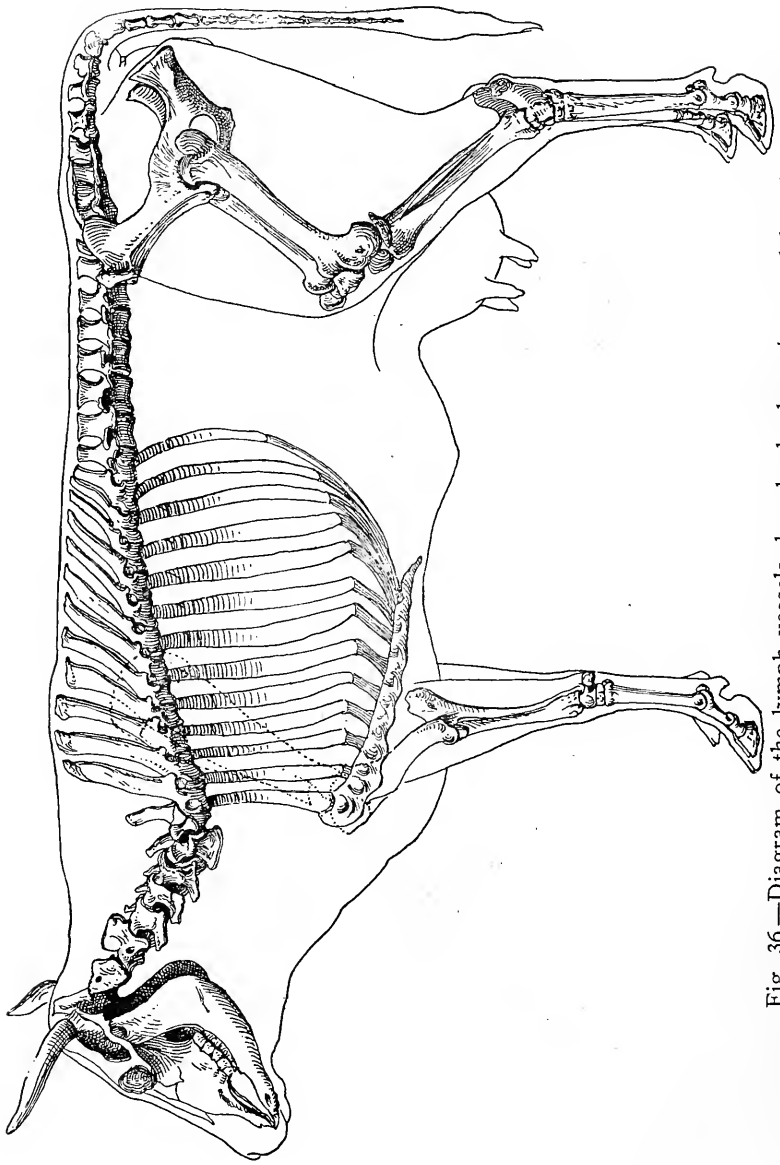
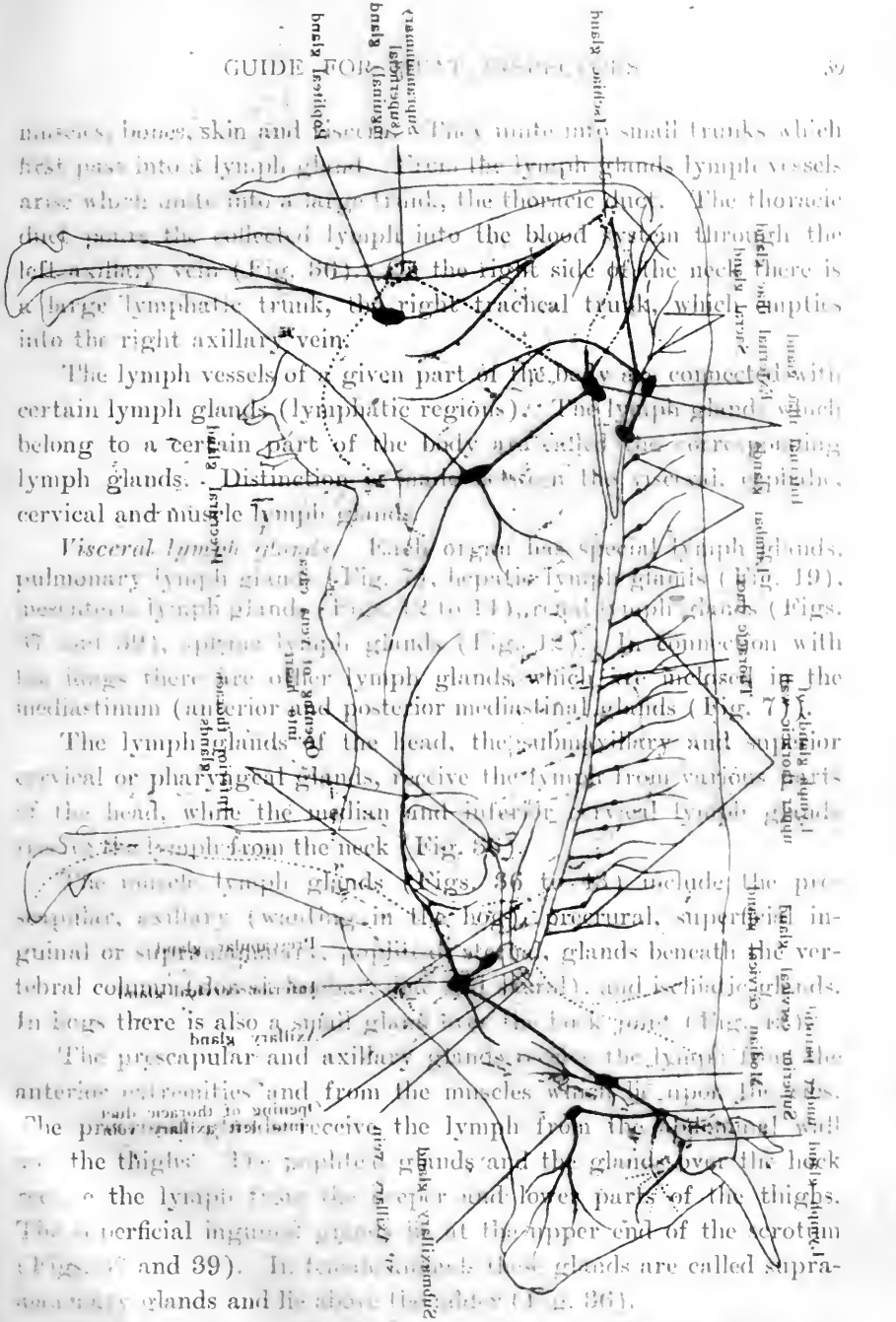


Fig. 36.—Diagram of the lymph vessels, lymph glands and general lymph trunks. (The dotted lines indicate deep lying parts.)



mucous, lungs, skin and [illegible]. They unite into small trunks which first pass into a lymph gland. From the lymph glands lymph vessels arise which unite into a large trunk, the thoracic duct. The thoracic duct pours the collected lymph into the blood system through the left axillary vein (Fig. 50). On the right side of the neck there is a large lymphatic trunk, the right tracheal trunk, which empties into the right axillary vein.

The lymph vessels of a given part of the body are connected with certain lymph glands (lymphatic regions). The lymph glands which belong to a certain part of the body and [illegible] corresponding lymph glands. Distinction is made between the visceral, epithelial, cervical and muscle lymph glands.

Visceral lymph glands. Each organ has special lymph glands, pulmonary lymph glands (Fig. 50, hepatic lymph glands (Fig. 19), pancreatic lymph glands (Figs. 12 to 14), renal lymph glands (Figs. 17 and 39), splenic lymph glands (Fig. 12). In connection with the lungs there are other lymph glands, which are enclosed in the mediastinum (anterior and posterior mediastinal glands (Fig. 7)).

The lymph glands of the head, the submaxillary and superior cervical or pharyngeal glands, receive the lymph from various parts of the head, while the median and inferior cervical lymph glands receive the lymph from the neck (Fig. 36).

The muscle lymph glands (Figs. 36 to 43) include the prescapular, axillary (wandering in the horse), precrural, superficial inguinal or supramammary, popliteal, [illegible] glands beneath the vertebral column [illegible] (lumbar), and ischiadic glands. In dogs there is also a special gland in the back [illegible] (Fig. 43).

The prescapular and axillary glands receive the lymph from the anterior extremities and from the muscles which lie upon the sides. The precrural glands receive the lymph from the abdominal wall and the thighs. The popliteal glands and the glands over the hock receive the lymph from the deeper and lower parts of the thighs. The superficial inguinal glands lie at the upper end of the scrotum (Figs. 38 and 39). In female animals these glands are called supramammary glands and lie above the udder (Fig. 36).

The glands under the dorsal and lumbar vertebræ receive the lymph from these vertebræ and from the muscles which lie upon them.

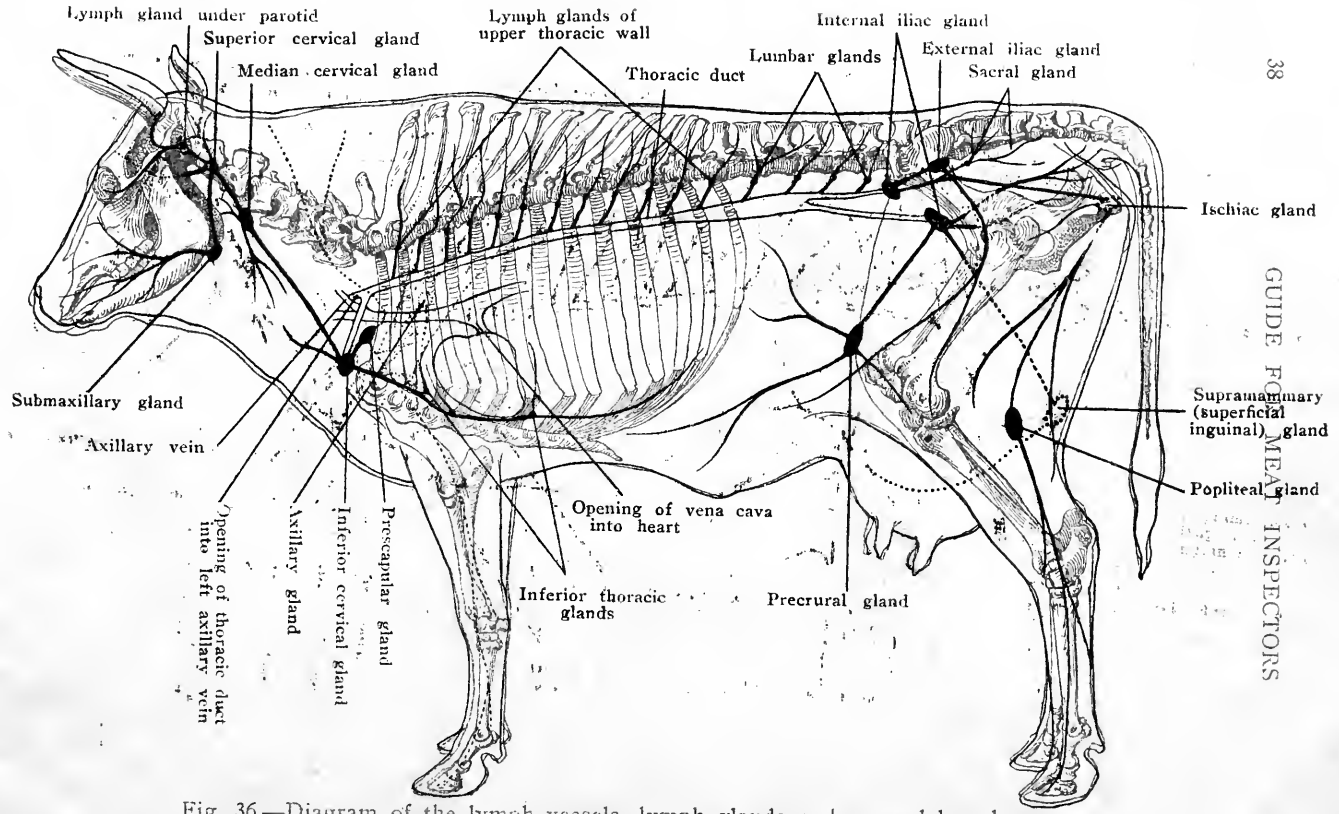


Fig. 36.—Diagram of the lymph vessels, lymph glands and general lymph trunks. (The dotted lines indicate deep lying parts.)

muscles, bones, skin and viscera. They unite into small trunks which first pass into a lymph gland. From the lymph glands lymph vessels arise which unite into a large trunk, the thoracic duct. The thoracic duct pours the collected lymph into the blood system through the left axillary vein (Fig. 36). On the right side of the neck there is a large lymphatic trunk, the right tracheal trunk, which empties into the right axillary vein.

The lymph vessels of a given part of the body are connected with certain lymph glands (lymphatic regions). The lymph glands which belong to a certain part of the body are called the corresponding lymph glands. Distinction is made between the visceral, cephalic, cervical and muscle lymph glands.

Visceral lymph glands. Each organ has special lymph glands, pulmonary lymph glands (Fig. 7), hepatic lymph glands (Fig. 19), mesenteric lymph glands (Figs. 12 to 14), renal lymph glands (Figs. 37 and 39), splenic lymph glands (Fig. 12). In connection with the lungs there are other lymph glands which are inclosed in the mediastinum (anterior and posterior mediastinal glands (Fig. 7)).

The lymph glands of the head, the submaxillary and superior cervical or pharyngeal glands, receive the lymph from various parts of the head, while the median and inferior cervical lymph glands receive the lymph from the neck (Fig. 36).

The muscle lymph glands (Figs. 36 to 43) include the prescapular, axillary (wanting in the hog), precrural, superficial inguinal or supramammary, popliteal, sternal, glands beneath the vertebral column (dorsal, lumbar, iliac and sacral), and ischiatic glands. In hogs there is also a small gland over the hock joint (Fig. 42).

The prescapular and axillary glands receive the lymph from the anterior extremities and from the muscles which lie upon the ribs. The precrural glands receive the lymph from the abdominal wall and the thighs. The popliteal glands and the glands over the hock receive the lymph from the deeper and lower parts of the thighs. The superficial inguinal glands lie at the upper end of the scrotum (Figs. 37 and 39). In female animals these glands are called supramammary glands and lie above the udder (Fig. 36).

The glands under the dorsal and lumbar vertebræ receive the lymph from these vertebræ and from the muscles which lie upon them.

The sacral glands receive lymph from the superior pelvic wall. The iliac glands receive lymph from the pelvic viscera, in female animals from the uterus. The ischiatic glands receive lymph from the posterior and upper part of the thigh musculature.

Fig. 37.—Position of lymph glands in cattle. (The pin heads indicate the position of concealed or small glands.)

Locating the lymph glands. In finding the lymph glands the accompanying illustrations should give satisfactory clues. A knowledge of the location of the lymph glands is one of the most important

parts of the education of the meat inspector. Every opportunity for practice in locating them should be seized. Such opportunity is frequently offered in condemned animals, particularly in calf fetuses. It should be remembered that in locating the lymph glands in the

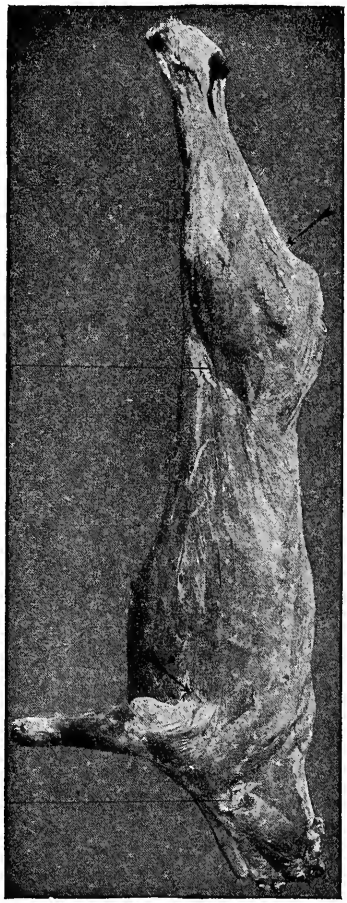


Fig. 38.—Position of the lymph glands in cattle.

practice of meat inspection the meat should be mutilated as little as possible.

The pulmonary glands are found between the division point of the trachea and the anterior lobes of the lungs (Fig. 7).

The mediastinal glands are located in the mediastinum (Fig. 7).

The hepatic glands are located at the porta hepatis (Fig. 19).

The mesenteric glands are found on the inferior border of the mesentery (Figs. 12 and 14).

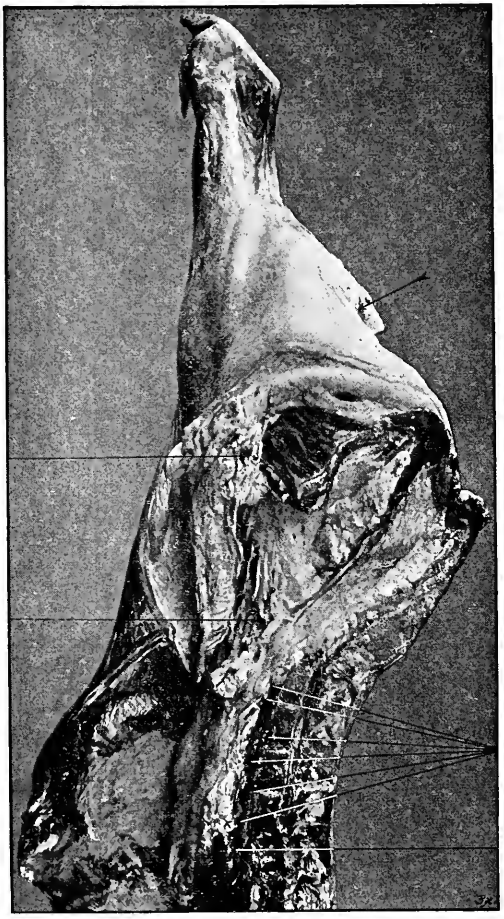


Fig. 39.—Hind quarter of beef with exposed lymph glands.

The renal glands are found on the renal pelvis (Fig. 41).

The splenic glands are located in the gastrosplenic ligament (Fig. 12) which remains attached to the stomach after slaughter.

The submaxillary glands are found in the mandibular space or on the excised tongue (Figs. 8, 41 and 42).

The upper cervical or pharyngeal glands are found behind the pharynx (Fig. 8).

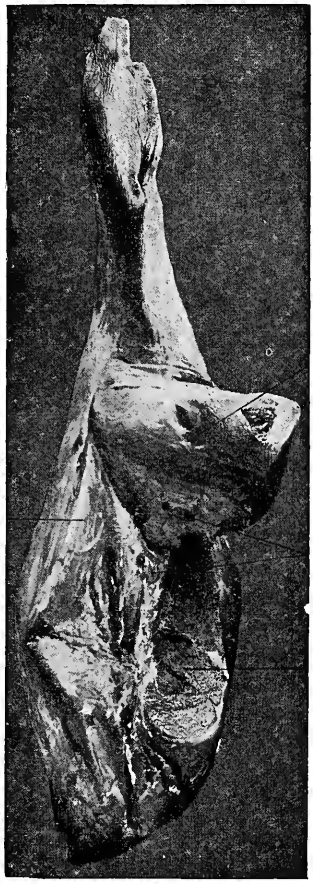


Fig. 40.—Hind quarter of beef showing the popliteal glands. (In inspection the muscles do not need to be cut but may be separated along the path of connective tissue.)

The other cervical glands are found on the neck or trachea (Figs. 37, 41, 42).

The prescapular glands are located in front of the shoulder joint under a muscle which must be cut through (Fig. 38). In old hogs

the prescapular gland is exposed by severing the head in a plane about one inch behind the posterior border of the jaw, extending from the upper to the lower border of the neck (Fig. 43).

The axillary glands are found under the scapula (Fig. 38).

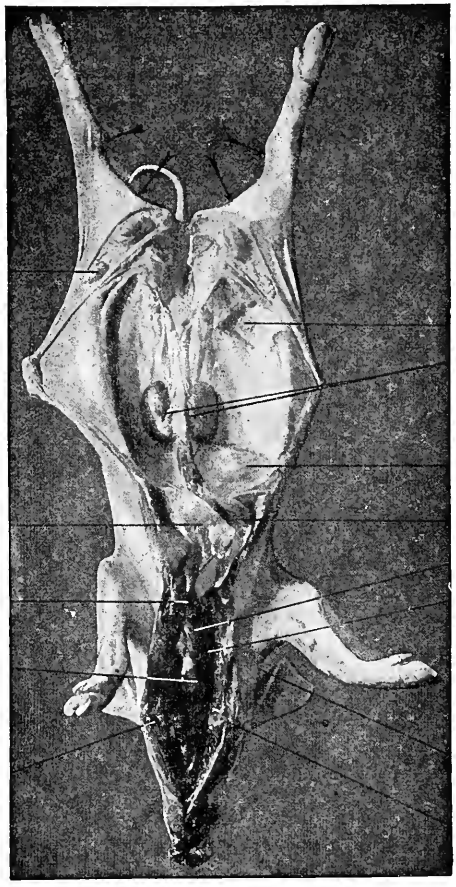


Fig. 41.—Hog carcass, front view, showing position of lymph glands. (The arrows show the position of the lymph glands over the hock joint and the popliteal glands.)

The precrural glands are located in the knee fold in front of the stifle joint between muscles which in cattle are to be cut from the outside and in swine from the inside (Figs. 38, 41 and 42).

The superficial inguinal glands in male animals are found under the cod fat or scrotal fat (Figs. 37 and 39). In cows the supramammary glands are found on the posterior upper border of the udder (Fig. 36), in sows they are found in fat tissue of the abdom-

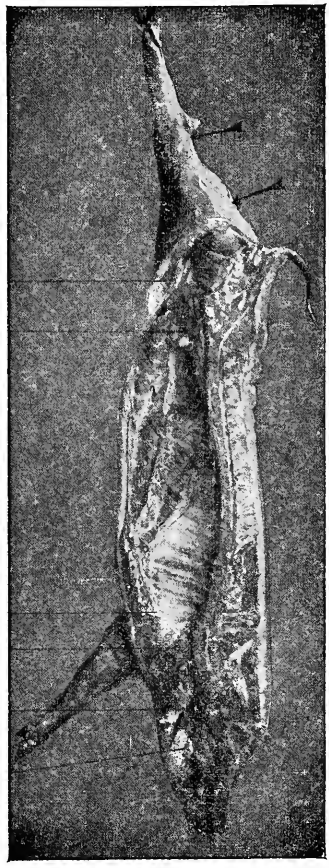


Fig. 42.—Median section of hog showing position of lymph glands.

inal wall near the line in which the belly is opened in slaughtering (Figs. 41 and 42).

The popliteal glands are found in the popliteal fossa between two muscles on the posterior border of the thigh (Figs. 37 to 42). A

careful incision is to be made from behind, in the plane of the stifle joint, in the connective between the two muscles or in the fat tissue.

The sternal glands are found on the lower thoracic wall and on the sternum (Figs. 37 and 42).

The vertebral glands are located just underneath the vertebral column (Figs. 37 and 39).

The iliac glands are found on the anterior wall of the pelvis under the peritoneum, in fat animals in the adipose tissue (Figs. 37 and 39).

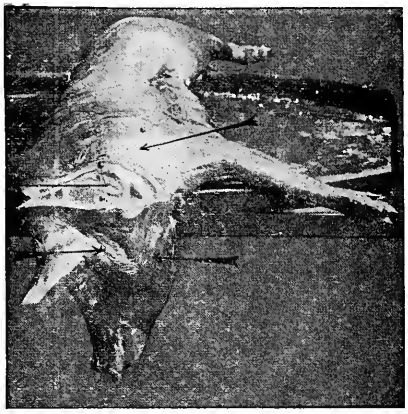


Fig. 43.—Position of prescapular gland in the hog.

The ischiatic glands are found on the posterior border of the ischium (Fig. 36).

Characteristics of the lymph glands. The lymph glands possess a firm but yielding consistency and a yellowish white or grayish blue color. Upon section a small quantity of clear fluid exudes. The muscle lymph glands are somewhat firmer than those of the viscera. In the healthy animal carcass the cut surface of some lymph glands (e.g., pulmonary glands) often shows a red coloration of the cortical portion. In old cattle, sheep and goats the pulmonary and mesenteric glands are often blackish. Associated with the large lymph glands we often find accessory lymph glands of pinhead size, and gray or red in color.

In well-bled carcasses the lymph is almost entirely removed from the body along with the blood. This is not the case in animals which have died a natural death. In such animals all parts, but particularly the skin and the outer surface of the carcass, feel moist.

The Spleen

The spleen is an accessory organ of the circulatory apparatus. It lies in the abdominal cavity on the left between the stomach and

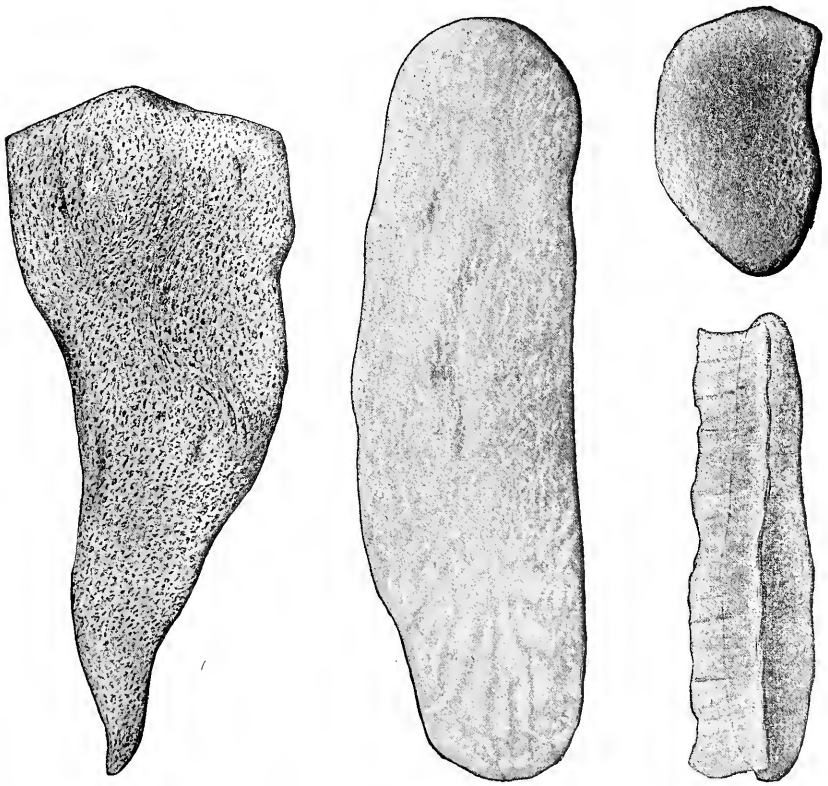


Fig. 44.—Spleen of horse at left, of steer in center, of sheep at right above, and of hog below (the latter with a part of the gastrosplenic ligament and omentum.)

body wall or diaphragm. The spleen is connected with the stomach by means of the gastrosplenic ligament. The spleen is an elongated

organ, of grayish blue, reddish brown or dark red color and soft-elastic consistency. On the cross-section the spleen is reddish brown. In this reddish brown mass (spleen pulp) minute white structures or follicles are to be seen.

Differentiation of the spleen of different food animals. The spleen of the cow is oval, with two flat surfaces. In bulls and steers the surfaces are arched outward. In sheep and goats the spleen is oval, but relatively short and broad, and exhibits rather strongly arched surfaces. The spleen of the hog is moderately arched, tongue-shaped, and somewhat triangular on cross-section (Fig. 44).

4. Skin or General Integument

The skin or general integument covers the whole body. It lies upon the bones and upon the muscles which are attached to the bones. Distinction is made between the subcutis by means of which the skin is connected with the rest of the animal body, and the skin proper or cutis in which the hair, oil glands and sweat glands are found. The oil glands secrete an oleaceous material which in healthy animals keeps the hair smooth and shiny.

Nomenclature of Exterior Regions of the Animal Body

In describing animals the following common terms are used (Figs. 45 and 46): Head, neck, trunk, and extremities or quarters. On the head distinction is made between the forehead (including the horns, occiput (behind the forehead), face (portion of head below the forehead), ears, eyes (with inner and outer angles), nose (muzzle, snout), cheeks and throat. The chief features of the neck are the upper and lower borders and the lateral surfaces. The neck vein lies on the side of the neck. The dermal fold on the lower border of the neck of cattle and in front of the chest is called the dewlap. The chief regions of the trunk are breast, belly or abdomen and rump. On the exterior of the breast we distinguish between the withers, lateral walls and lower border. The chief regions of the abdomen are the upper abdominal wall (back and loin), lateral ab-

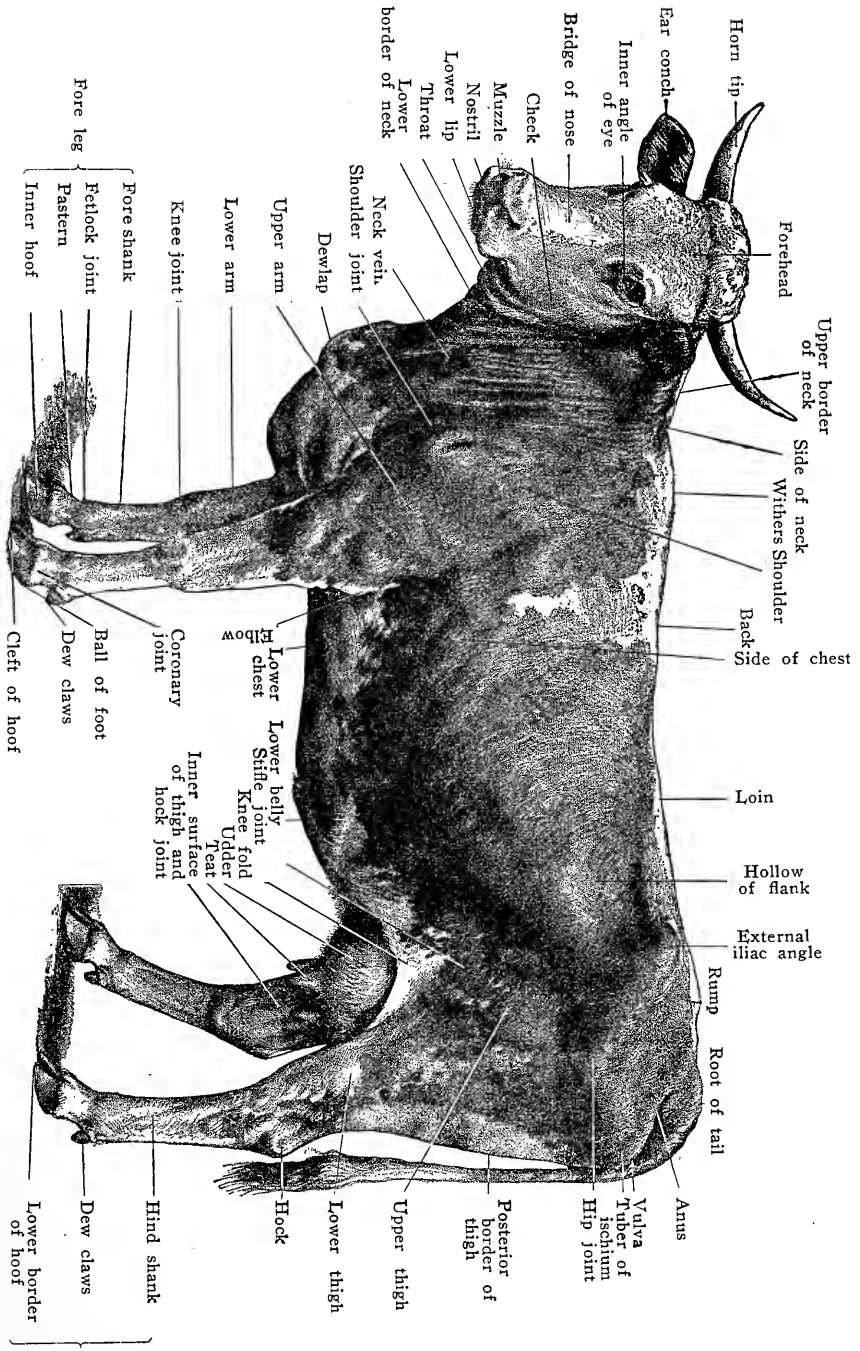


Fig 45.—External topographic anatomy.

dominal walls with the flank hollows and the flanks, and the lower abdominal walls with anterior, middle and posterior regions. The navel lies in the middle abdominal region, the udder and testicles in the posterior region. The area between the anus and vulva is called

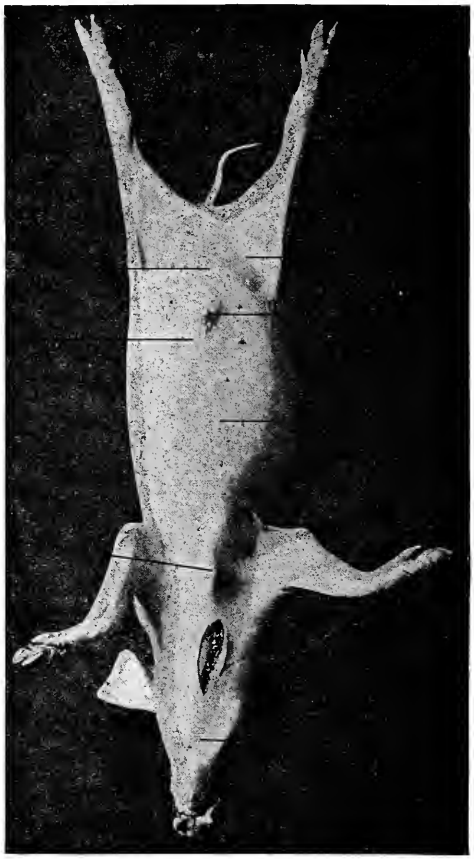


Fig. 46.—External topographic anatomy.

the perineum. The rump is the continuation of the back. In this region we find the sacrum, the external iliac angles and, in poor animals, the ischiatic prominences. The tail with the tail head, shaft and brush, is a continuation of the rump.

In the anterior extremities the chief regions are shoulder, shoulder joint, arm, elbow, forearm, knee and foot (with shank, fetlock joint, pastern and hoofs).

In the posterior extremities the chief regions are hip joint, round of thigh, stifle joint, lower thigh, hock and foot. The knee fold lies in front of the stifle joint. In ruminants the feet terminate in hoofs and dew claws, the latter being enclosed in a hornlike substance similar to that on the horn processes of the frontal bones.

III

Functions of the Animal Body with Special Reference to the Blood and Lymph Circulation, and to the Chief Evidences of Health in Living Animals

1. Functions of the Animal Body

The skeleton has the function of supporting the body and furnishing the framework of cavities in which the vital organs are located (cranial, vertebral, nasal, buccal, thoracic, abdominal, pelvic cavities).

The muscles bring about locomotion. By their contractions they move the bones and through them the body.

The connective tissue connects various parts with one another and serves as a support for compound organs like the liver, lungs and kidneys. It forms the foundation of the adipose tissue. As a result of the accumulation of fat the connective tissue structures become thicker and opaque. Animals with a strong development of adipose tissue are characterized as well fed or fat, those with a less extensive development of fat are called poor, and those in which the fat tissue has disappeared are known as emaciated. Connective tissue frequently contains elastic tissue which lends it greater firmness and elasticity. Such elastic tissue is found in the ligamentum nuchæ, and in the sternal cushion upon which the animal rests while lying down.

The respiratory apparatus carries fresh air to the body and removes the respired air from the lungs. It consists of the air passages (nose, larynx, trachea and its branches), and the respiratory or pulmonary tissue proper. In the pulmonary parenchyma the pulmonary artery, originating from the right ventricle, divides into minute capil-

laries in which the blood gives up its carbon dioxide and receives oxygen from the air.

Digestive apparatus. In the alimentary tract the feed stuffs which the animal has ingested are changed into a form in which they may be absorbed by the intestinal vessels. The undigested portions of the food are discharged through the anus as feces.

The cephalic portions of the alimentary tract (lips, teeth and tongue) have the function of prehending and comminuting the food, and forming it into balls which can be swallowed. Moreover in the mouth the saliva is added to the food from the salivary glands.

The hog masticates the food but once, whereupon it is swallowed. Cattle, sheep, and goats masticate their food twice (ruminants). The first time the food is merely bitten into large fragments, formed into balls and swallowed. It then passes into the rumen, from which it is returned to the mouth and again masticated (rumination).

In ruminants the stomach undergoes regular movements which can be heard as rumen sounds by placing the ear against the left abdominal wall. In healthy ruminants the inspector can observe one sound per minute or two sounds every three minutes in the form of rubbing or rustling noises. On both sides of the abdomen fairly distinct intestinal sounds may be heard as whistling, gurgling or metallic noises. In healthy, well fed animals both sides of the abdomen are moderately arched, in fasting animals hollowed. The collapsed condition is particularly marked in the flank hollows (Fig. 45).

The urinary apparatus serves to excrete the urine which is separated from the blood by means of the kidneys. From the renal tissue the urine passes into the renal pelvis and thence through the ureter into the bladder. The urine accumulates in the bladder and is discharged as a strong stream at intervals, several times a day. The urine is of a light or dark red color, of thin, fluid consistency and of characteristic odor.

The sexual apparatus has the function of reproduction. The ovaries produce the eggs, which pass through the oviducts into the uterus. The egg after fertilization develops into a fetus in the cavity of the uterus. The fetus is surrounded by two fetal membranes which are filled with fluids. The external fetal membrane is connected with the uterine mucosa and thus secures nourishment for the embryo.

The fluids in the chorion and amnion are clear and odorless. In advanced fetuses which were alive at the time of the slaughter of the mother animal the hair is firmly attached to the skin. The mode of attachment of the chorion to the uterine mucosa varies. In ruminants it takes place by means of uterine cotyledons (Figs. 30 and 31), in swine by a diffuse placenta. At parturition the os uteri opens and the fetal membranes protrude first. These membranes burst and allow the fetal fluids to escape. Then the fetus passes out, followed usually at once by the fetal membranes, now known as the afterbirth. The udder secretes the milk to nourish the young.

The testicles produce the semen which is stored up in the seminal vesicles, and during copulation is discharged through the urethra into the female sexual organs.

The sexual odor, sexual maturity. Male animals at sexual maturity may possess a disagreeable odor (boar odor, buck odor, and more rarely, bull odor). Moreover, in boars an induration of the skin is observed on both sides of the breast, the so-called shield, which during sexual excitement may be erected. Boars also make a sucking sound with the mouth under sexual excitement.

The nervous system has the function of transmitting sensory and motor impulses. The nervous system receives stimuli through nerves which arise from the brain and spinal cord. The internal temperature is also regulated by the nervous system. All warm blooded animals, including of course all food animals, have a constant internal temperature in both high and low temperatures of the environment.

Circulatory apparatus. The heart has the function of pumping the blood to all parts of the body and back again. Distinction is made between systemic, pulmonary, and portal circulations. The systemic circulation is that which takes place between the heart and all parts of the body (Fig. 47). In this circulation the blood is carried to all parts (bones, muscles, muscle lymph glands, viscera, skin), and is then returned to the heart.

Fate of pathogenic bacteria which gain entrance to the systemic circulation. If pathogenic bacteria gain entrance to the systemic circulation they are carried to all parts of the body with the blood. There are certain infectious diseases in which the pathogenic organisms are always found in the blood, e.g., swine erysipelas. In such

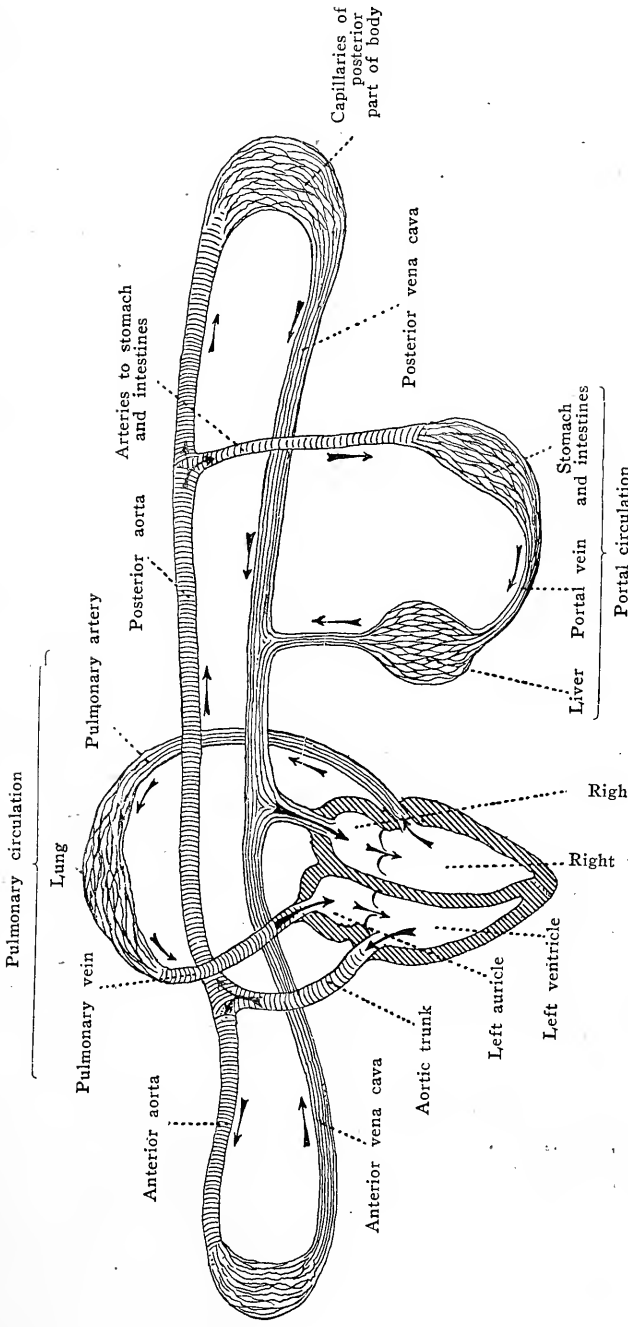


Fig. 47.—Diagram of blood circulation.

diseases all parts of the body including the viscera carry the virus, and may be responsible for distributing the disease if the meat of affected animals is sold in a raw condition. In other infectious diseases the pathogenic organisms soon disappear from the general circulation. They may, however, cause infection in various parts of the body during their short sojourn in the blood. Such is the case with tuberculosis. If in a case of tuberculosis the spleen, kidneys, bones, joints muscles or muscle lymph glands are affected, the distribution of the disease is due to the circulatory apparatus.

The pulmonary circulation is concerned with the movement of the blood from the right ventricle to the lungs and back to the heart. It has the function of freeing the blood from carbon dioxide and supplying it with oxygen.

The portal circulation. The portal vein is the vessel which receives the blood from the stomach, intestine, pancreas and spleen, and carries it to the liver. In the liver the portal vein breaks up into capillaries and supplies to the liver cells the materials for the formation of bile. From the capillaries of the portal system the blood is collected in the hepatic vein which empties into the posterior vena cava. The portal vein enters the liver at the porta hepatis.

Fate of pathogenic bacteria which gain entrance to the pulmonary or portal circulations. When pathogenic organisms find their way into the pulmonary or portal circulation, they become lodged in the organ in which the capillaries of the system occur, i.e., in the lung or liver. In cases of tuberculosis the lesions, after entrance of the tubercle bacilli into the pulmonary circulation, may be confined to the lung, or to the liver in case of portal infection. Thus the final results of infection, particularly in tuberculosis, depend in large degree upon whether the bacteria gain entrance to the systemic, pulmonary or portal circulation.

The lymph circulation. The lymph originates from the blood in all parts of the body. It is first collected in small lymph vessels, which gradually unite into larger and larger vessels. The lymph finally reenters the blood system in the axillary veins through the thoracic duct and right tracheal trunk. Before the lymph reaches a large collecting vessel it passes through one or often more lymph glands. In the

latter case the lymph vessel after leaving a gland passes to another gland before entering a large lymph trunk (Fig. 36).

Fate of pathogenic bacteria which gain entrance to the lymph. The lymph glands operate like sieves or filters which hold back all coarse impurities and even pathogenic bacteria from the flowing stream of lymph. The lymph is therefore purified before reaching the collecting trunk. If an inflammation arises in a given lymphatic region the corresponding lymph glands become inflamed. If tuberculous alterations are present in a lymphatic region the corresponding lymph glands show tuberculous alterations. From the condition of the lymphatic glands, therefore, the inspector learns whether there are inflammatory or tuberculous foci in the corresponding lymphatic region. Occasionally the lymph glands are tuberculous even in the absence of demonstrable lesions in the lymphatic region. In such cases the tubercle bacilli wandered through the lymphatic region and were first caught in the lymph glands. Tuberculous alterations in the lymphatic region, however, may be so small that they could not be detected without cutting the part into thin discs. If the tuberculous infection has been distributed by the systemic circulation the alterations of the lymph glands indicate which parts of the body are affected with tuberculosis. All parts of the body in which the lymph glands show tuberculous alterations may be considered as tuberculous.

In fresh infection of the blood with tuberculosis or with diseases of which the bacilli remain permanently in the blood (septicemia, anthrax, swine erysipelas), all the lymph glands of the body may be swollen.

The spleen may be looked upon as a large lymph gland. It may exhibit swelling under the same conditions as those which determine the swelling of lymph glands in general (fresh blood infection with tuberculosis, anthrax, swine erysipelas).

The skin is a protective organ and also has an important part in the regulation of body temperature. It is covered with hair, wool or bristles. Cattle and goats shed their coat in the spring. The muzzle of cattle and the snout of swine are peculiar dermal structures (Figs. 45 and 46). In healthy animals the skin is soft and easily raised in folds. Except during the prevalence of low temperatures the coat should be smooth and shiny.

In healthy animals the coat is shed in a regular manner, in diseased animals the shedding is delayed. In autumn the hair coat is thicker for the reason that fine hairs arise between those of the summer coat. The muzzle of healthy cattle is moist, feels cool and is covered with minute drops of liquid, like dew. In healthy animals the temperature of the skin is uniform. On the trunk, particularly those parts most heavily covered with hair, the temperature is higher than that of the tips of the ears, horns or feet, for the reason that in the latter parts the loss of heat is relatively greater.

2. The Evidences of Health in Food Animals

In the inspection of food animals the following may be looked upon as important signs of health.

1. *Nutritive Condition*

Healthy animals presented for slaughter are expected to be well nourished. Healthy animals may be poor if poorly fed, overworked, in early development or in advanced age. In such cases the poor condition is due to the normal disappearance of the adipose tissue.

2. *Position, Gait, and Expression*

Healthy animals have a frank expression and take an active interest in their surroundings. In healthy cattle the head is carried high, the back straight, the weight equally distributed upon the four feet. They quickly move aside if touched, and if not exhausted, readily arise from a recumbent position when urged. Upon getting up, healthy animals usually curve the back in stretching themselves. Old, exhausted animals are less active than young, rested but unfattened stock. Healthy sheep carry the head high, point the ears upward and forward and resist all attempts to catch them. Healthy goats are usually more active than sheep, turn toward visitors but are prepared to spring away. Healthy hogs if left to themselves move about grunting and sniffing, usually with the head down and the tail curled.

3. *Surface of the Body*

In healthy animals the skin is readily movable and loose. It may be raised up in folds, which quickly disappear. It is only in fat hogs that the skin seems firmly attached to the ribs. The hair lies down smoothly and is shiny. The fleece of sheep should show no breaks in its continuity. The surface temperature should be uniform except on the tips of the ears and horns and on the feet, at which points it is lower. The muzzle and snout always feel cold and moist.

4. *Digestive Organs*

Healthy animals have a good appetite and rapidly consume their normal rations. If their hunger is not fully satisfied they eagerly grasp proffered feed. In cattle, sheep and goats rumination begins soon after feeding. Eructation also occurs from time to time. When hunger is satisfied the flank hollows, particularly the left, are nearly filled, while in fasting animals they are concave. The feces of grown cattle vary according to the ration. With cattle on dry feed the feces are of the consistency of thick gruel and are dropped in cakes of brownish-green color. With cattle on succulent rations the feces are softer or even fluid. The feces of calves are more yellowish. Hog feces are cylindrical or jelly-like, clay colored or grayish-yellow. The manure of sheep and goats is blackish and in small balls.

5. *Vulva, Vagina, Udder*

In healthy animals the labia of the vulva are in apposition. The mucous membrane of the vulva is pale red. If an animal has recently borne young or is about to bear young, the labia are swollen and the mucous membrane is darker red. Before and after parturition there is a discharge of a slimy nature. For some time after parturition this discharge may be thick, yellowish and faintly streaked with blood. During lactation the udder is softly granular to the touch, after the close of the period it is soft and flabby.

6. *Respiratory Organs*

In healthy animals respiration goes on quietly without effort and almost without being perceptible. The number of respiratory movements per minute is 10 to 30 in cattle, 12 to 22 in sheep and goats, 10 to 20 in hogs. Respiration may be greatly hastened as the result of excitement, transportation, great heat, or violent exercise. Respiration is not thereby rendered difficult, however. The nostrils are not opened abnormally wide, and the alæ of the nose move but little. As a rule coughing does not occur, but if it does occur, it is strong and loud.

7. *Internal Body Temperature*

The body temperature should be taken with an officially tested thermometer, preferably a maximum thermometer. In health the temperature ranges from 37.5° to 39.5° C. in cattle; 39° to 40.5° C. in calves, sheep and goats; 38.5° to 40° C. in hogs. If the body temperature is above or below these figures, a diseased condition is to be suspected.

37.5 C = 99.5 F } Cattle
39.5 C = 103.1 F }
39. C = 102.2 F } Calves, sheep + goats
40.5 C = 104.9 F }
38.5 C = 101.3 F } Swine.
40. C. = 104. F }

IV

Antemortem Inspection, Including the Means of Identifying Animals

1. Purpose of Antemortem Inspection

As already stated (page 1) ante-mortem inspection should determine whether there are symptoms of disease which would affect the wholesomeness of the meat, or whether the animal has a disease which is important from the standpoint of veterinary police work.

Diseases to be looked for. In cattle tuberculosis, anemia, actinomycosis, pyemia, peritonitis, septicemia, Texas fever, pneumonia, abscesses, anthrax, blackleg, and various affections of the udder, vagina, joints and hoofs. In calves diphtheria, diarrhea, navel disease, joint swellings, anemia, pyemia, septicemia, Texas fever. In hogs swine plague, hog cholera, tuberculosis, pyemia, abscesses. In sheep and goats scab, anthrax, dropsy, anemia, jaundice, septicemia, caseous lymphadenitis, pneumonia.

Ante-mortem inspection serves to shorten and simplify meat inspection proper. If in the live animal the skin is found to be healthy, no further attention need be given it post mortem. Similarly no post-mortem inspection of the nostrils is required if during life no discharge or abnormal sounds were noted in them. Moreover the brain and spinal cord require no further attention if there is no dullness of the expression or symptoms of paralysis during life. If no lameness is noted ante mortem the inspector need not look for inflammatory alterations in the extremities (bones, muscles, tendon sheaths and joints). If, however, in ante-mortem inspection pathological symptoms are observed, an indication is thereby obtained of the parts which require special attention after slaughter.

2. Connection of Antemortem Inspection with Meat Inspection

Ante-mortem inspection should take place as shortly as possible before slaughter, at least not longer than two days. It should preferably be done in daylight, or, when this is not possible, in electric light.

3. Procedure in Antemortem Inspection

a. Means of Identifying Animals

In all cases the inspector should note the genus and sex of the

Fig. 48.—Dentition of a yearling steer (with milk teeth only.)

animal, and in condemned animals also the age, color and other identification marks. In other words the animal is classified as steer, cow, calf, sheep or hog, and male or female. With respect to sex, cattle are classified as bulls, steers, cows and calves. In classifying sheep we have rams, wethers, ewes and lambs, and with goats bucks, does and kids. In swine distinction is made between boars, barrows and sows.

The accurate determination of age is of importance only in cattle. In sheep, goats and swine the statement of age is usually omitted. Young animals of these genera are simply called lambs, kids and pigs.

In cattle age is determined by the characteristics of the lower incisors. There are four pairs of these: nippers, inner middle, outer middle and corner incisors (Fig. 48). Calves have milk incisors. These teeth are porcelain white, relatively small, and possess a neck or constriction at the point of insertion into the gum (Fig. 48). The milk teeth are shed in regular order and are replaced by permanent incisors. The nippers are shed at the age of one and one-half years, and the permanent nippers reach full height at two years. The inner middle incisors are shed at the age of two and one-half years,

Fig. 49.—Dentition of a 3-year-old steer.

the outer middles at three and one-half, and the corners at four and one-half years. In each case the permanent teeth reach full size six months after the milk teeth are shed. At five years of age, therefore, the permanent incisor dentition of cattle is complete (Fig. 51). At the age of six years a neck appears on the nippers like that on the milk nippers, at seven years on the inner middles, at eight years on the outer middles, and at nine years on the corners. In cattle past ten years of age the incisors are much worn, small, loose, project

from their alveoli, and stand apart from one another. By the age of fifteen years the incisors have fallen out or are present merely as stumps.

The above statement regarding the age of cattle is of course based on German experience. In this country the various dental changes take place at younger ages, most of the phases of shedding and replacement being passed through nearly six months in advance of the ages given above. The reason for this difference is not apparent. Perhaps we have developed an earlier maturity in our cattle.

Fig. 50.—Dentition of a 4-year-old steer.

In calves and young cattle, age is determined by the size of the body and the development of the horns. At two months the horn cap is developed. At three months the horn tip is still movable (3 cm long in bull calves, 2 cm long in heifer calves). At four months the horn tips are 1 cm longer. In bull calves the horn tips become fixed at four months, in heifer calves at five or six months.

In sheep, which likewise have four pairs of lower incisor teeth, shedding begins with the nippers at one to one and one-half years, followed by the inner middles at one and one-half to two years, the outer middles at two and one-quarter to two and three-quarter years,

and the corners at three to three and three-quarter years. The permanent incisors are distinguished from the milk incisors by their greater size and width (Figs. 52 and 54). After the age of six years

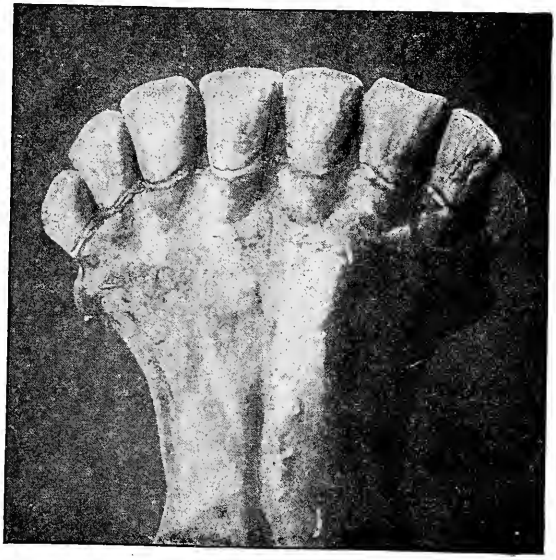


Fig. 51.—Dentition of a 5-year-old steer.

Fig. 52.—Dentition of a yearling sheep (with milk teeth only.)

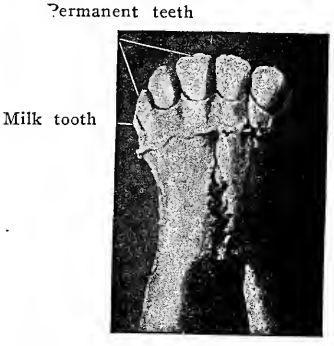


Fig. 53.—Dentition of a sheep 2½-3 years old.

a notch appears between the two nippers (Fig. 55). Between the age of ten and twelve years the incisors fall out.

The hog has six incisors in either jaw and also a tusk. The pig is born with corners and tusk. After two to four weeks the nippers appear, and after two and one-half to three months the lower middle

Fig. 54.—Dentition of a 4-year-old sheep.

Fig. 55.—Dentition of a 6-year-old sheep.

incisors (Fig. 56), while the upper middle incisors do not appear till after three months (Fig. 57). A swine which has a complete set of incisors in both upper and lower jaw is hence more than three months old, and according to German usage is no longer a pig. Shedding be-

Fig. 56.—Dentition of lower jaw of 3-months-old pig.

gins with the corners at nine months, followed by the nippers at twelve to fifteen months, and the middles at sixteen to eighteen months (Figs. 59 and 60).

Color is an important matter in the description of cattle. The coat is referred to as black, white, red, brown, buff and mixed color. White animals with large black areas are called black-blotched. Those with a few small black or red areas are called spotted. Those with

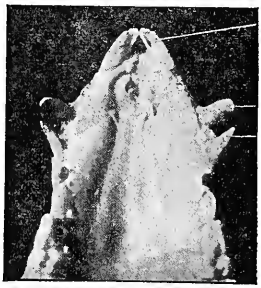


Fig. 57.—Dentition of upper jaw of a 3-months-old pig (with milk nippers, corners and canines; the middle incisors are just breaking through.)

numerous irregular black or red areas are known as speckled, and those with numerous small black or red areas as brindle. The belt is a special type of blotch, as are also the back and belly stripes.

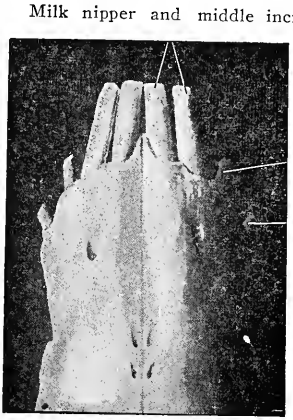


Fig. 58.—Dentition of lower jaw of 7-months-old pig.

Special identification marks are found on the head and feet. White spots on the forehead are known as flakes or stars according to their size. A narrow white stripe reaching to the muzzle is called

a blaze. A broad stripe extending to the cheeks constitutes a white-face. The blaze may be interrupted. White marks on the feet are

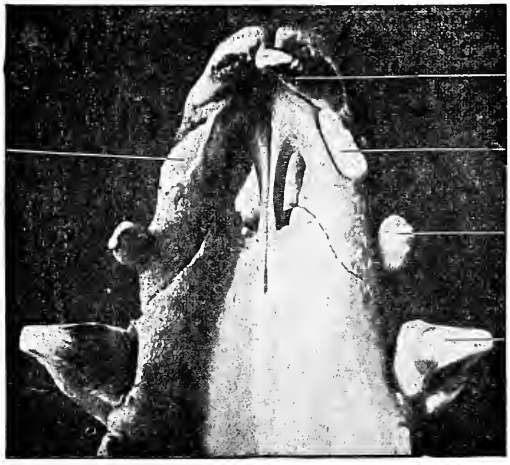


Fig. 59.—Dentition of an 18-months-old pig (upper jaw), with permanent incisors only.

Fig. 60.—Dentition of lower jaw of an 18-months-old pig, with permanent incisors only.

known as white crowns, white pasterns, or, if extending farther upward, white feet.

With self-colored animals, isolated, small white spots which occur on any part of the body may be used for identification purposes. Sheep and hogs may be referred to as white, black or spotted.

In cattle the condition of the horns may be used for description by referring to their shape and direction. Furthermore brands on the horns or skin, and ear marks may be similarly utilized.

b. Detection of Disease in Living Animals

In antemortem inspection the resting position of the animals is to be noted. Animals in a recumbent position are to be roused in order that the inspector may see whether the animal can stand up without help, and whether the standing attitude is normal with all four feet equally loaded. In case of serious disease or lameness the animal may be unable to stand. The existence of bone fractures will thus be detected at once. Animals which favor one foot or which require help in getting up should be made to walk about in order that the inspector may determine in what part the lameness is located. In postmortem inspection it will then be necessary to give special attention merely to those parts (limb, joint, muscle or bone) which were found to be affected during the ante-mortem inspection. In this connection it should be remembered that those lamenesses which are not accompanied with any general disturbances (weakness, dullness of the sensorium, loss of appetite, fever) are of little concern for the inspector. On the other hand, lamenesses which cause disturbance in the general condition, particularly lamenesses which follow purulent inflammation of the joints, tendons and tendon sheaths, are of great importance in meat inspection.

Cattle which have been kept in a stall for a long time show an uncertain gait when first turned out, partly on account of being unaccustomed to walking and partly on account of overgrowth of the hoofs. It is a difficult matter to make cattle trot except by goading. Cattle which have been driven or transported long distances show exhaustion in the position and carriage of the body. After long railroad journeys cattle may appear to be lame and should be allowed a resting period before inspection.

1. The nutritive condition. Animals may be poor, medium fat

or well fattened. It should be borne in mind that bulls and milch cows are always less well nourished than steers which have been specially fed for slaughter. A poor condition may also be observed during the development of the animal, in old age, under insufficient rations and in work oxen. A good nutritive condition is to be recognized by the fulness of the musculature and by the strong development of the adipose tissue on the iliac angles, ribs, shoulder joint, ischiatic prominences, in the scrotal region and in front of the udder. In well fattened animals the naturally angular parts become rounded.

2. Carriage, expression and attention to surroundings. Healthy animals are characterized by high carriage of the head, active movements, erect position, uniform distribution of the body weight on the four feet, and ready response. They do not tremble except under the influence of cold. Trembling over the whole body or in certain parts is ordinarily a symptom of serious febrile disease. Sick animals show a lax carriage of the body, hold the head low, and take slow, painful and irregular steps.

In healthy animals the expression is lively and the eyes clear and bright. An active interest is taken in the surroundings by all healthy animals except fat hogs. Sick animals have a tired, fixed, expressionless look, clouded eyes, and take no notice of what is going on. Sick animals may not heed shouts or blows with the hand, of if they do take notice, they soon relapse into a state of apathy.

3. Surface of the body. In healthy animals the skin is readily movable, loose and soft, and the temperature of the body is higher than that of the tips of the ears and horns or of the legs. In case of febrile disease the ears, horns and legs are hot. In healthy animals the skin is free from thickenings, nodules, excessive desquamation, scabs, ulcers or bald spots of regular or irregular form. In actinomycosis there may be thickenings and nodules in the skin; in mange and non-contagious eczema desquamation, scabs, bald spots, and even ulcers may be present. Healthy animals occasionally lick and rub certain parts of the body. Continued rubbing of certain parts, especially in warm stalls or during warm weather, indicates the presence of skin parasites (mange, mites or lice). Mangy animals show in various ways that rubbing affected parts gives them relief. The skin

of healthy animals may readily be lifted from the subjacent tissues, and the folds thus produced disappear as soon as the hand is removed. In cattle affected with chronic progressive diseases the skin may feel as if grown firmly to the ribs and may crackle on being raised (hide-bound).

The hair lies down smoothly in health except in low temperatures, when it may be rough as if brushed up. In health the hair is also shiny, in disease harsh even in warm weather. In health the hair is shed in the spring, in disease the shedding may be so delayed that the winter coat is carried into the summer. In some diseases bald spots may arise, or the hair in certain areas may be matted with pus and blood, or filled with scales and scabs. In cases of sooty or pitchy mange in hogs, dark brown or black scabs are often found on the skin.

In examining the skin special attention should be given to hot, doughy, painful, inflammatory swellings; cold, painless, dropsical swellings due to air under the skin as in blackleg and parturient blackleg; wounds and ulcers.

In the case of wounds and ulcers on the breast, belly, or in the joints and sheaths of the tendons, it should be determined whether these processes have extended into and affected the deeper lying parts. In such cases the general health is affected (loss of appetite, apathy, weakness, fever). In cattle, nodules in the region of the head and neck indicate actinomycosis. In sheep, a matted fleece and bare spots indicate scab. In hogs, a general erythema of the skin occurs in erysipelas; circumscribed red spots in diamond skin disease.

4. Digestive organs. The examination of the digestive organs includes an inspection of the lips, muzzle, and if possible the behavior of the animal in eating and drinking. In healthy animals the lips are closed and there is no dripping of saliva. The muzzle is shiny, moist and cool. In sick animals there may be froth on the lips, or a stringy discharge of saliva. In foot-and-mouth disease vesicles or ulcers may appear on the muzzle and snout. During the prevalence of fever in cattle the muzzle is dry, rough, warm and cracked. Healthy animals, except immediately after a full ration, eagerly grasp proffered feed, and drink with large swallows. Swine root in the soil for food. Sick animals refuse food and water entirely, or eat sparingly and do not refuse water. No masticatory noise is heard in healthy

cattle except while they are eating. A smacking sound may be heard in cattle affected with foot-and-mouth disease, and there is also a discharge of saliva from the mouth. In healthy cattle rumination invariably begins soon after eating, in sick cattle it may be suppressed. In health the abdomen is moderately filled out, but with neither unilateral nor bilateral tympanites. Sudden, violent distension of the left side of the abdomen in cattle indicates bloating from green feed. A slight bloating may occur in anthrax and tuberculosis. Bilateral distension of the abdomen occurs in peritonitis. By placing the ear against the left abdominal wall of an ox the rumen sounds may be heard in regular recurrence, about three times in two minutes. In sick cattle these sounds are suppressed or occur irregularly.

In health the feces are passed at regular intervals and in normal condition. In cattle the manure is of the consistency of pancakes, not fluid, frothy, malodorous, nor mixed with blood, mucus, or flat or tubular structures. Constipation may result from various causes, such as peritonitis or intestinal volvulus. Thin, malodorous feces, with or without admixture of mucus and blood, indicate the presence of enteritis. The passage of blood with the feces in the absence of diarrhea is a symptom of anthrax.

5. Vulva, vagina, udder. In health the urine is of clear yellow color, without repulsive odor, and is discharged in a vigorous stream. Diseases of the bladder and renal pelvis are accompanied with cloudy urine mixed with mucus and of unusual odor. Difficult or irregular urination is a symptom of cystitis. Bloody urine is a characteristic symptom of hematuria, Texas fever and anthrax. In healthy animals the vulva is closed. The lips are not swollen nor painful, and there is no vaginal discharge. The region of the vulva is not contaminated with fresh or dried pus. Swelling of the vulva and a vaginal discharge are observed in post-partum metritis and vaginitis, vesicular exanthema and infectious vaginitis. A discharge without swelling of the vulva occurs in leucorrhea. In retention of the afterbirth a stinking discharge takes place. Usually in such cases shreds of decomposing afterbirth hang out of the vagina. In prolapsus uteri the invaginated uterus projects from the vulva like a large red tumor. In prolapsus vaginæ the vagina protrudes between the labia in the form of a red spherical tumor of the size of the two fists. Prolapsus

uteri is a serious disease, since metritis and septicemia are often associated with it. Prolapsus of the vagina, on the contrary, is ordinarily of little importance in meat inspection. The mucous membrane of the vulva and vagina under ordinary conditions is pale red and without vesicles, wounds or ulcers. Bright red or dark red coloration, wounds and ulcers on the mucosa of the pudenda are symptoms of inflammation or vesicular exanthema. In heifers the udder is small and rather firm; in cows during lactation it is uniformly softly granular to the touch. Immediately after parturition there is often a doughy, painless swelling in the region of the udder. The milk from all quarters of the udder should be uniformly white. For the first few days after parturition the milk or colostrum has a yellowish color. In cases of mammitis the udder is swollen, hot, painful, and the secretion is watery and contains solid masses. In acute mammitis the udder may yield a stinking fluid.

6. The respiratory organs. The nasal passages are to be examined and the rate of respiration determined. In health the muzzle is cool. There is either no discharge from the nose or a slight, thin, clear and odorless fluid. Purulent, malodorous or bloody discharges from the nose indicate a diseased condition, as do also respiratory sounds originating in the nose. Healthy animals breathe quietly. In cases of pneumonia, pleurisy, anthrax, swine erysipelas, septicemia and many other diseases respiration is often labored and the respiratory movements hastened. Breathing may also be accompanied with pronounced rising and falling of the ribs, and visible movements of the nostrils and abdominal walls. Ordinarily healthy animals do not cough. In diseased animals, on the contrary, particularly in cases of tuberculosis, pleuropneumonia and swine plague, spontaneous coughing often occurs either isolated or in prolonged attacks. Coughing may also be artificially induced by pressure on the larynx. Respiratory sounds may arise from contraction of the nasal passages and larynx. Certain diseases in the region of the larynx may so interfere with breathing that the animal holds the head stretched forward in an unnatural position.

Determination of the Internal Temperature

If the inspector has any doubt regarding the seriousness of a given disease or symptom, particularly if there is weakness, apathy, loss of appetite or some other disturbance of the general condition, the body temperature should be taken by means of an officially tested thermometer in which the mercury has been shaken down below 35° C. The thermometer should be oiled or moistened and inserted into the rectum. The thermometer should remain in the rectum for five minutes before being removed for reading. A temperature above normal is denoted as febrile.

Symptoms of the Common Diseases

In anthrax, blackleg and hemorrhagic septicemia there is high fever, in the early stages exaltation followed by weakness, apathy, loss of appetite and rapid breathing. In anthrax there may be swellings in the skin and blood in the feces. The milk secretion fails in cows affected with anthrax. Characteristic symptoms of blackleg are found in external swellings which spread rapidly and crackle when rubbed with the hand. Necrosis of the skin occurs over these spots. If blackleg swellings occur on one of the legs, the animal goes lame. In hemorrhagic septicemia, in addition to the above-mentioned symptoms, there may be extensive subcutaneous swellings on the head, neck dewlap and tongue, causing the tongue to protrude from the mouth, or respiration becomes difficult and is accompanied with coughing.

In foot-and-mouth disease of cattle the inspector may observe smacking with the lips, frothing at the mouth, and vesicles or superficial ulcers on the muzzle, buccal mucosa, between the hoofs or rarely on the udder. If vesicles or ulcers appear between the hoofs, the animal goes lame and lies down much of the time. At the onset of disease the general condition of the animal is disturbed (fever, weakness, loss of appetite, emaciation). In acute cases the general disturbance is more pronounced and persists longer. The general condition of the animal improves as soon as the lesions in the mouth begin to heal.

In febrile general diseases connected with some affection of the udder, uterus or vagina, weakness and loss of appetite occur together with painful swelling of the udder, alteration of the milk, discharges from the vagina and diarrhea, the feces sometimes being mixed with blood and malodorous. In febrile diseases of the joints and hoofs, in addition to general disturbances there may be severe lameness and painful swellings of the joints or hoofs.

In diphtheria of calves swellings appear on the cheeks; in dysentery, stinking white evacuations; in umbilical diseases, painful, hot swelling of the navel together with great weakness, apathy and fever. Similar swellings may also appear on various joints, particularly the knee, hip and stifle joints. In slight cases the affected animals go lame, while in acute cases they lie down or are unable to walk.

The most conspicuous symptom of foot-and-mouth disease in swine is lameness, accompanied with vesicles and bleeding ulcers on the hoofs and dew claws. More rarely vesicles and ulcers appear on the snout together with smacking of the lips and salivation.

Swine erysipelas is characterized by extended or circumscribed erythema of the skin, weakness, crawling into the straw, apathy, loss of appetite, constipation followed by diarrhea, and fever. In cases of swine plague the symptoms are coughing, labored breathing, emaciation, gummy eyes and scabs or pock marks on the skin, and, in acute cases, fever. In chronic swine plague there may be no fever, but the nutritive condition is bad. Swine affected with hog cholera show diarrhea, emaciation. Fever is always observed in acute cases, but may be wanting in chronic cases.

In sheep scab the fleece is broken and uneven, and there are bare spots which the animals bite and rub, especially in warm weather. Rubbing these spots gives the sheep relief. Sheep affected with anthrax show a disturbance of the general condition, swellings on the skin and bloody urine. Sheep often die suddenly from anthrax, like an apoplectic stroke. Sheep affected with gid worm exhibit compulsory movements, turning around in circles or pressing the head against the wall. In dropsy doughy, cold, painless swellings are found under the skin, especially on the shanks and neck. In grazing animals water may collect under the skin of the head and neck.

Texas fever in cattle is carried by means of ticks, which are in

most cases readily found on the skin of affected animals. The mucous membranes are usually yellowish, and the urine bloody. The onset of the disease is followed by rapid prostration and emaciation.

Cattle affected with the ordinary form of actinomycosis are conspicuous on account of the enlargement of the jaw bone. Fistulous openings may occur over the tumor and discharge yellowish, sticky pus. In the form of the disease commonly known as wooden tongue, the tongue is stiff and awkward and the animal cannot readily use it in grasping food.

Cattle affected with rabies exhibit increasing restlessness, loss of appetite, and change in disposition. They bellow loudly, butt and paw violently, and viciously attack other animals. Constipation, muscular spasms, and increased salivation are also observed. Paralysis begins to appear about the fourth day.

V

Methods of Slaughtering, Cuts of Meat, Live and Dressed Weight, Postmortem Changes in Meat, and the Recognition of the Age and Sex of Slaughtered Animals

1. Chief Methods of Slaughtering

The death of food animals should be brought about without unnecessary pain. The whole process of slaughtering should also be calculated to insure the greatest possible keeping quality in the meat. This purpose is served by removing as much blood as possible through the severed cervical or anterior thoracic blood vessels. In well-bled animals it is difficult to press out even a few drops of blood from cross-sections of the liver, kidneys or musculature. Here and there a drop or two may be pressed out of a blood vessel.

Distinction may be made between three methods of slaughtering:

a. Simple bleeding by sticking in the thorax or cutting the throat. The Jewish method or schechtering belongs to this class.

b. Bleeding after the previous mutilation of the medulla by pithing or by the use of a killing ax.

c. Bleeding after a previous stunning.

a. Simple Bleeding by Cutting the Cervical or Thoracic Vessels

Sticking in the breast is executed by opening or severing the vessels at the entrance to the thorax. In cutting the throat or schechtering, the animal is thrown, tied, and the head held so that it lies on the horns and nose. Thereupon, in schechtering, the neck is cut almost to the spinal column by three quickly executed strokes

of a long, sharp knife. An apparatus for holding the head as shown in Figure 61 is recommended in schechtering. In slaughtering according to the requirements of the Jewish religion a sort of inspection is made by the schechter, and animals which are passed are known as kosher. This inspection is based on entirely different principles from those which govern the veterinary inspector.

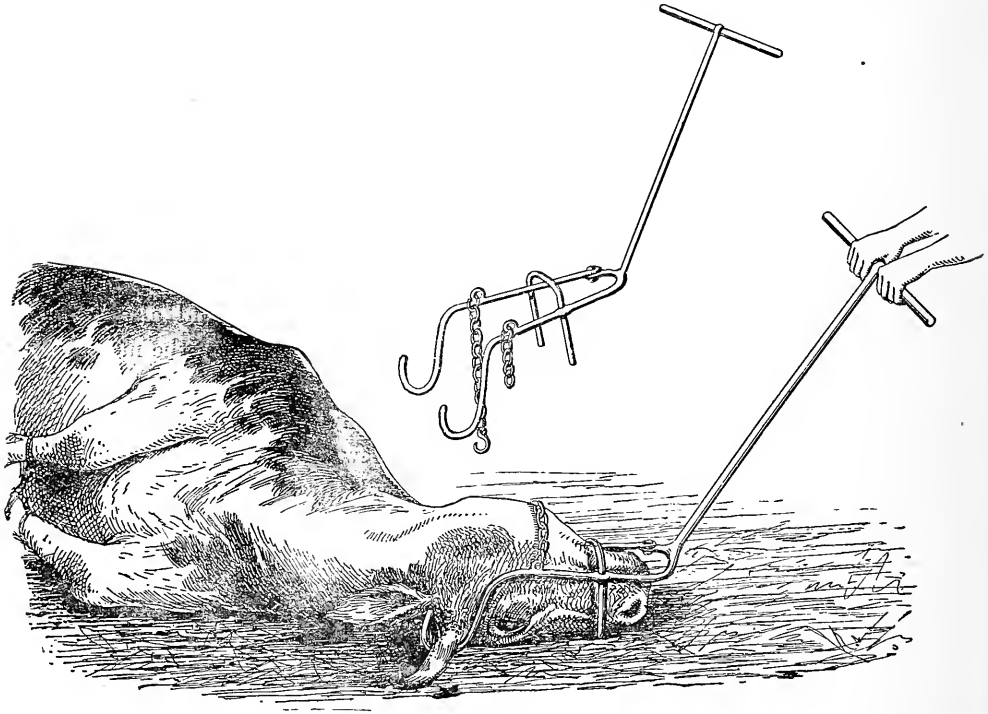


Fig. 61.—Head tackle for cattle in slaughtering by Jewish method.

b. Bleeding after Mutilation of the Medulla

In the method of slaughtering by bleeding after a previous mutilation of the medulla oblongata a knife is violently driven into the space between the occipital bone and the first cervical vertebra, or a blow is dealt to this spot with a killing ax. The animal instantly falls to the floor and remains motionless. Thoracic or cervical sticking may then be accomplished without restraining the animal.

c. Bleeding after Previous Stunning

Animals are stunned by a blow on the forehead or by injuring the forehead and brain. Prostration and unconsciousness are the immediate results of stunning. Various instruments may be used for stunning (club, killing ax, slaughter mask, spring bolt apparatus, rifle, special or bolt shooting apparatus). If a blow is delivered upon the middle of the forehead with a club or the head of an ax, concussion of the brain results, the animal is paralyzed and falls to the floor. The killing ax is composed of a wooden handle, and attached to one end at right angles an iron structure one end of which is sharpened in the form of a gouge. The gouge end is driven through the frontal bone into the brain by the blow. By the use of the slaughter mask a movable, gougelike bolt is driven into the brain as with the spring bolt apparatus and similar instruments. The bolt hammer, for use in killing sheep, is similar in construction to the killing ax. It is used differently, however, being placed upon the frontal bone and driven into the brain with a mallet. The Chemnitz stunning apparatus, for small animals, differs from the bolt hammer in the possession of a movable striking bolt. In the shooting apparatus there is a pistol barrel, to the end of which a shield-shaped iron portion is screwed. In the end of the barrel a ball cartridge is placed and fired by a blow with a hammer. In the bolt-shooting apparatus and Behr's slaughter pistol a shooting bolt in place of the ball is driven into the brain through a barrel as in the shooting apparatus. In our abattoirs cattle are stunned with a poll ax. Bulls and a few old animals with hard heads may be shot with a rifle. Sheep and hogs are caught up with a shackling apparatus, after which the throat is cut without previous stunning. In small institutions and country slaughter houses shooting is frequently resorted to with cattle.

The actual details of the methods of slaughter in different abattoirs are determined by the proprietors and foremen in these establishments. The process has to be carried on in such a manner as not to interfere with or inconvenience the inspectors. After reaching the

stock yards all animals are allowed to rest overnight before being slaughtered. If animals are feverish or excited at the time of slaughter they do not bleed freely. The best method of slaughter is that which accomplishes the unconsciousness of the animal most quickly and brings about the most complete bleeding. This insures to the highest degree the keeping quality of the meat.

2. Commercial Methods of Slaughtering

The inspector must familiarize himself with the commercial methods of slaughtering in order that he may detect at once any unusual cuts which may have been intentionally made on the carcass.

As soon as death occurs (which may be determined by the cessation of the eye reflex) skinning of cattle and sheep, and scalding of hogs, are commenced. With cattle the head is carefully skinned and removed. A liberal amount of fat and meat is left in connection with the tongue. The head is marked so that it can readily be identified if cause for condemnation be found. On the floor the carcass is held in place by a pritch. The feet are removed without opening the skin far enough for the shanks to become bloody. The gullet is lifted without cutting the windpipe. The skin is then opened by a straight cut along the whole length of the animal. Since about half of the work is done while the animal is on the floor and the other half after hoisting the carcass it is convenient to operate a double slaughter floor. The breast is sawed along the middle line, the abdomen opened, the caul removed, and the remainder of the skinning, splitting, and removal of the viscera is done while the carcass is gradually hoisted. The liver is carefully removed and placed on a special truck. The whole carcass is washed with hot water. On sixteen double beds the regular crew of men slaughter 130 to 150 cattle per hour.

Sheep are hoisted alive by a shackling apparatus. All details of slaughtering and running the carcasses into the cooler are accomplished without the sheep ever touching the floor. A string gang will slaughter about 2,000 sheep per day on a floor space of 32 to 80 feet. Special care is exercised not to allow the wool to come in contact with the mutton.

Hogs are shackled by a hind leg, hoisted by a revolving wheel and run on a rail, where they are stuck. They are then scalded and run through a scraping machine, after which the details of opening the carcass and removing the viscera are accomplished while the car-

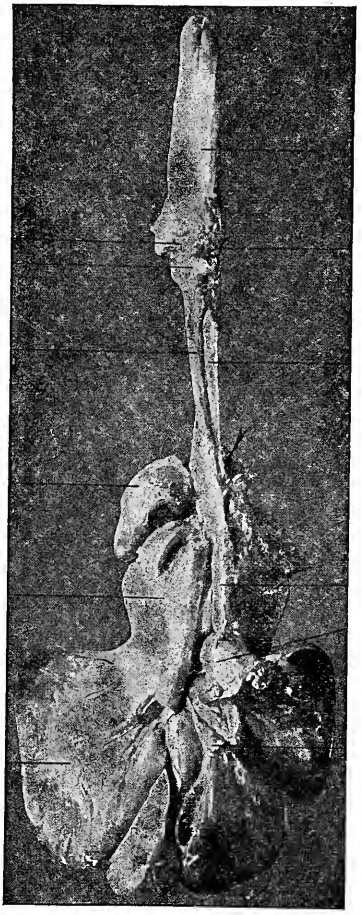
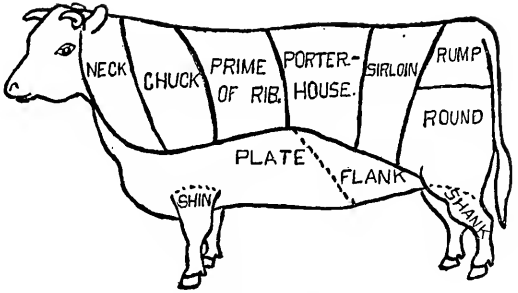
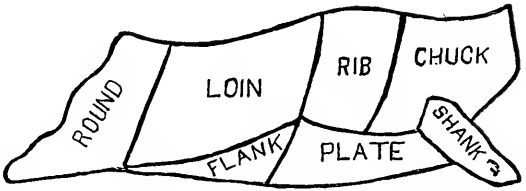


Fig. 62.—Haslet or pluck of hog.

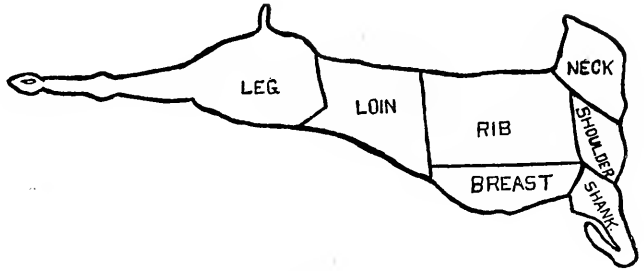
casses pass by the gang of butchers, each one of whom performs one small part of the process. Inspectors are stationed along the lines of cattle, hogs and sheep at points where the stage of the process



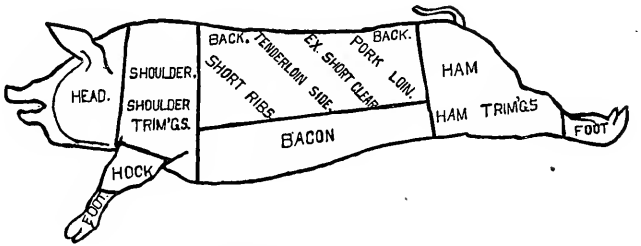
Retail cuts of beef



Cuts of pork



Cuts of mutton



Wholesale cuts of beef

Fig. 63.—Chicago cuts of meat.

of slaughtering permits the most thorough examination of the lymph glands, viscera and other parts.

The system of cuts in vogue in the wholesale and retail trade varies in different cities. In Chicago each side of beef (Fig. 63) is cut for the wholesale dealer into seven pieces, four along the back and three along the belly. The back row of pieces includes chuck, rib, loin and round, while the belly row consists of shank, plate and flank. In the retail trade the back row of pieces is subdivided so as to obtain chuck, prime rib, porterhouse, sirloin, rump and round.

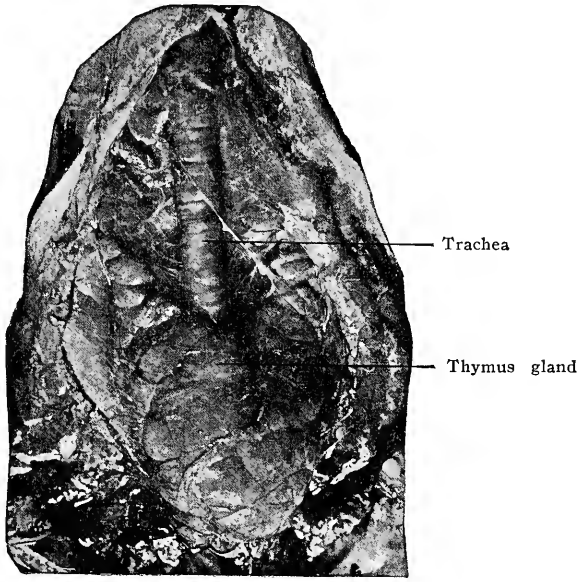


Fig. 64.—Thymus (sweetbread) of calf in natural position in anterior part of chest.

The belly row of pieces yields the shin, plate, flank and shank. In European cities the division is still more complicated. Thus, in London the series of cuts along the back includes clod and sticking, pony, forerib, loin, rump, aitch bone, silver side, top side, leg. The belly pieces comprise shin, brisket, fore quarter flank, flank, thick flank.

In packing house practice hogs are cooled to a temperature of about 35° F. before being cut up. On the Chicago market pork is

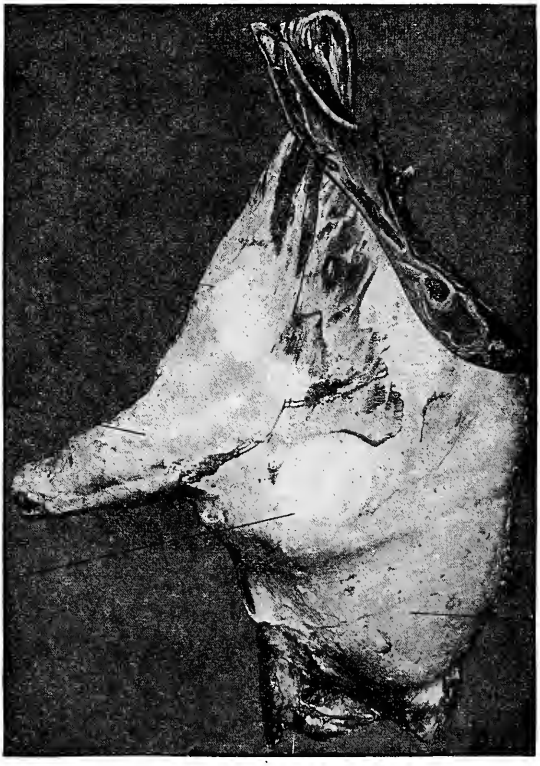


Fig. 65.—Fore quarter of a bull.

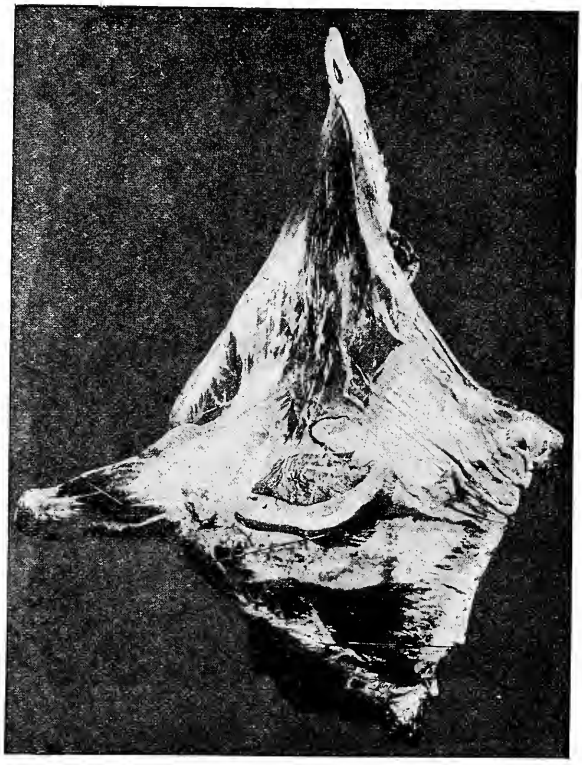


Fig. 66.—Fore quarter of a steer.

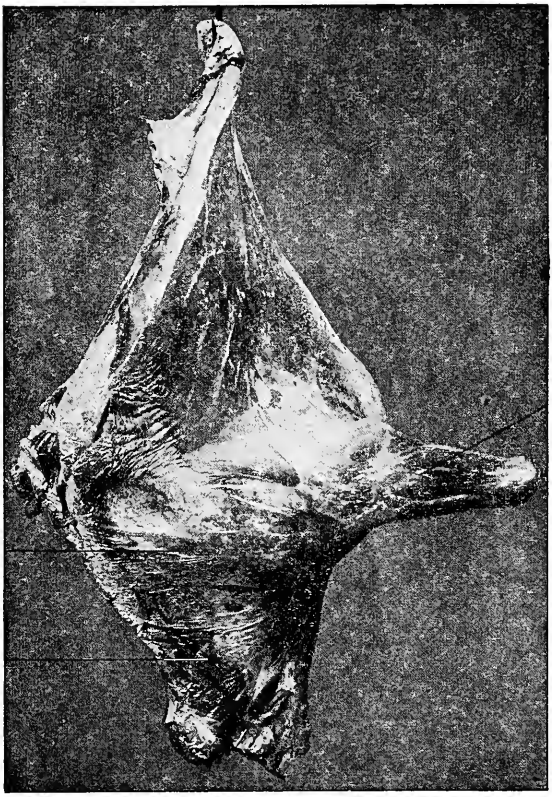


Fig. 67.—Fore quarter of a cow.

Fig. 68.—Hind quarter of a bull.

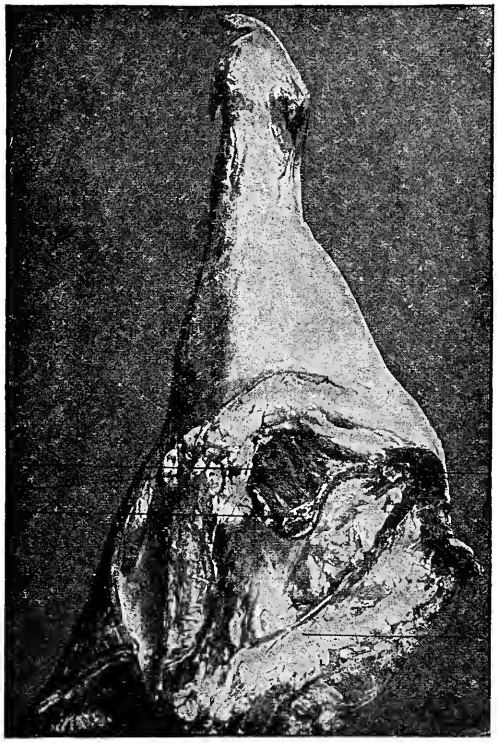


Fig. 69.—Hind quarter of steer.

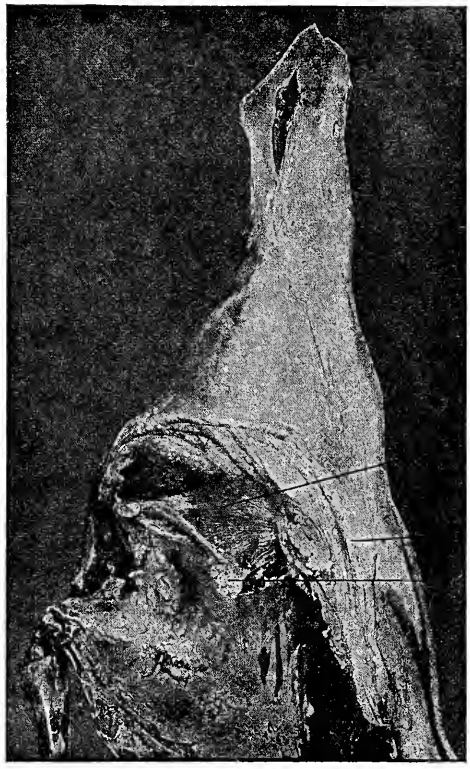


Fig. 70.—Hind quarter of cow.

cut into head, shoulder, shoulder trimmings, back, bacon, short ribs, side, tenderloin, extra short clear, pork loin, ham, ham trimmings, and feet. The English cuts of bacon hogs are end of collar, prime collar, thick back, back ribs, loin, corner of gammon, fore hock, top of thick streaky, prime thick streaky, thin streaky, flank, gammon hock.

The ordinary cuts of mutton are neck, shoulder, shank, rib, breast, loin, leg. The neck piece, also called the chine, may be divided into neck and scrag end. Chops are taken from the leg, loin, neck or breast. Cutlets are taken from the thick end of the loin. The saddle consists of both loins.

Veal is commonly cut into head, neck, withers, back, loin, leg, breast, shoulder, flank and feet. Veal fillet is the leg piece with the bone removed. The haslet is comprised of heart, lungs and liver. Both the thymus and pancreas are sold as sweetbreads.

3. Live Weight and Dressed Weight

The live weight of an animal is the weight of the live animal on the hoof. The dressed weight of cattle and sheep is the weight of the two halves or the four quarters. The difference is due to the removal in slaughtering of the blood, skin, head, feet, erternal sexual organs including the udder in cows, and the viscera with the exception of the kidneys. In the dressed weight of hogs the head, kidneys and kidney fat are included. The percentage of dressed beef varies considerably according to the breed, age, feeding and other factors. In well-prepared cattle it ranges from 55 to 65 per cent. Pure bred beef animals or good grades should dress about 60 per cent. of beef. Dairy breeds and scrubs usually yield a lower per cent. of dressed beef. The hide amounts to about 7 per cent. of the total weight, the fat to 5 or 6 per cent. Good hogs dress 65 to 80 per cent. of pork. Of this total about 12 per cent. is ham, 9 per cent. shoulder and 13 per cent. lard. The dressed weight of sheep and lambs ranges from 50 to 63 per cent. In general, fat animals yield a greater dressed weight than poor animals. The meat of medium fat animals is of greatest nutritive value for the reason that it contains most

protein. The meat of very fat animals contains relatively less protein, but is of better flavor.

Pure muscle meat constitutes about 40 per cent. of the weight of a fat steer, 48 per cent. of a medium fat steer, 30 per cent. of a fat sheep, 38 per cent. of a medium fat sheep, 37 per cent. of a fat hog, 48 per cent. of a poor hog. The kidney fat and mesenteric fat constitute 5 to 9 per cent. of the dressed weight, and the bones about 15 per cent.

4. Changes in Meat after Slaughter

Muscle tissue becomes firm and stiff after slaughter (rigor mortis). This process begins in the cephalic and cervical muscles and may appear within ten to fifteen minutes or not till after several hours. Rigor mortis persists for one to several days. Meat acquires an agreeable flavor as a result of the chemical processes which determine rigor mortis. The flavor of meat is improved by preservation in cold storage.

5. Recognition of the Age and Sex of Slaughtered Animals

As explained in a previous chapter, if the head is present the age may be determined by the teeth, or, in the case of cows, by the rings on the horns. Moreover, if the cartilages between bones or on the ends of bones are still unossified, the animal may be considered young. Particularly good evidence of the age of an animal may be obtained by cutting through the middle line of the under side of the pelvis (ischium and pubis). This surface is cartilaginous in young animals, bony in old animals.

Sex can be recognized from certain features of the carcass even in the absence of the reproductive organs. Thus, in bulls the musculature of the nape of the neck and shoulders is very strongly developed (Fig. 65), the inguinal canal remains open, and the attachments of the urethra are to be seen on the ischiatic cut (Fig. 68). The steer is distinguished from the bull by the weaker development of the shoulder and neck musculature (Fig. 66), and by the extensive deposition of fat in the subcutaneous connective tissue and scrotal regions

(Fig. 69). Moreover, in bulls and steers the adductor muscle of the thigh has a triangular cross-section. The tuberosity of the pubis is larger in bulls than in steers (Figs. 68 and 69).

Even if the udder of a cow has been removed, the hind quarters may be readily recognized from the shape of the adductor muscle of the thigh. Its cross-section is oval, not triangular (Fig. 70). Heifers are to be distinguished from cows by their small udder, which is completely permeated with fat. As a general rule, the horns are short and strong in bulls, medium strong and long in steers, slender and of medium length in cows.

VI

Routine of Meat Inspection

1. General Considerations

Time of inspection. For obvious reasons inspection may best be done simultaneously with the process of slaughtering. In federal inspection the inspector is always present at the time of slaughter. If inspection took place some time after slaughter the post-mortem

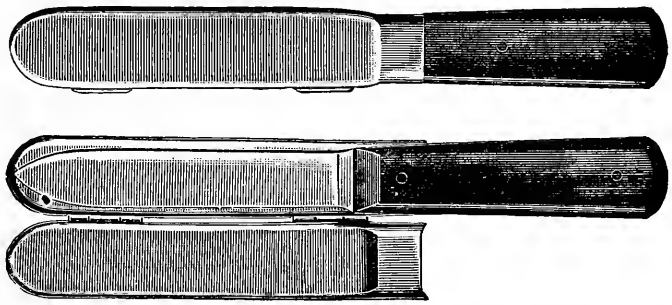


Fig. 71.—Scalpel for use in inspection.

changes in the meat would make the work more difficult. If the inspector is present he can supervise the whole process and prevent any fraudulent operations on the part of the butchers.

If the inspector were not present at the time of slaughter he would be unable properly to interpret his findings. A very slight matter might be exaggerated in importance. Collections of pathological fluids would escape the notice of the inspector. Moreover, it would be possible for a butcher to remove pathological tissue surreptitiously.

The only light for inspection is daylight. Slaughtering is seldom done except in daylight. Recent improvements in abattoirs include a better illumination than heretofore of the killing floors.

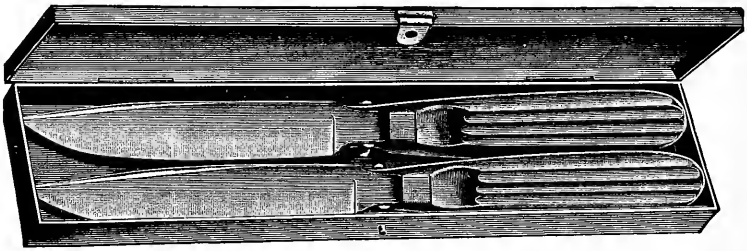


Fig. 72.—Scalpel with metal handle in metal box.

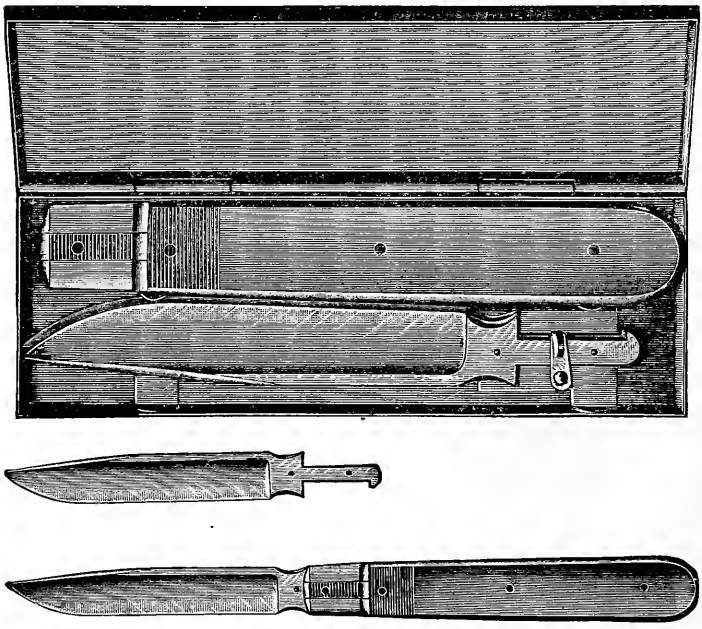


Fig. 73.—Scalpel made according to Jess.

No part of an animal can be taken away or its identity lost until the carcass has been passed upon by the inspector. Heads may be marked so as to indicate the carcasses to which they belong. Cauls,

livers and other viscera may be placed on trucks bearing numbers corresponding to the numbers of the killing beds on which the carcasses are handled.

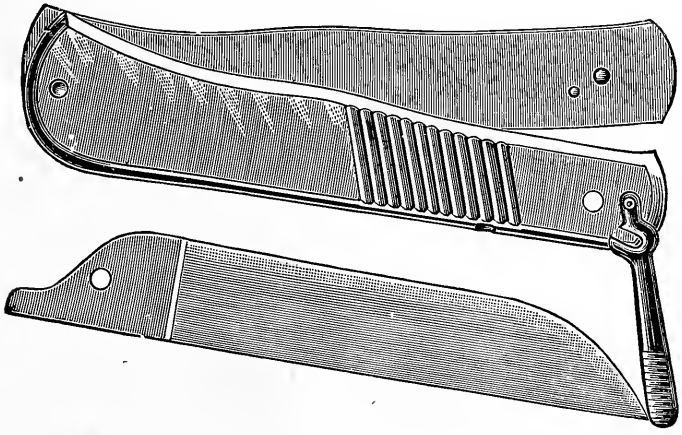


Fig. 74.—Folding scalpel with metal handle made according to Gundelach.

The inspector will ordinarily have use for at least two thoroughly cleansed butcher knives. These should preferably be smooth, all

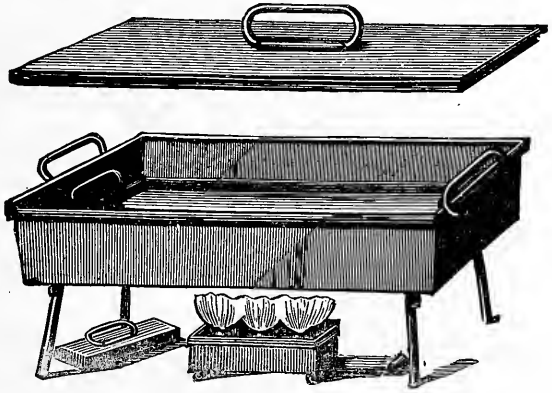


Fig. 75.—Tin plated instrument sterilizer with perforated tray.

metal, and without grooves or corners which would make cleansing more difficult (Figs. 71 to 74). So long as the organ or part incised proves to be healthy the knife is adequately cleaned by wiping. If

the knife becomes contaminated with infectious virus, it must be disinfected before being used again. The instruments may be sterilized in a 2 per cent. solution of soda in a suitable pot or in a special sterilizer (Fig. 75). The inspector should not incise pathological foci the nature of which is evident from mere inspection or palpation. If the incision of a disease focus is unavoidable, steps should be taken at once to prevent contamination of other parts of the carcass, the floor or other parts of the abattoir. If such contamination has already occurred the hands may be cleaned with brush, soap and warm water. The floor may be scrubbed and rinsed off with antiseptics. Contamination may be removed from meat by trimming off the surface layer or cutting away the part in question.

2. Examination of Various Parts of the Carcass

The different parts of the body are examined by ocular inspection, palpation and incision. The size, color, sheen, and other features visible to the unaided eye are noted by mere ocular inspection. This work must be done by daylight or by adequate artificial illumination. Mere ocular inspection is not sufficient in the case of the lungs, liver, spleen, uterus, udder and tongue. These organs should be palpated in order to determine their firmness and the alterations which may have taken place within their structure. With certain parts even a combination of ocular inspection and palpation are not sufficient to determine possible pathological processes. In such cases the deeper layers are to be exposed by incision or dissection. Lymph glands, the condition of which is always to be determined, are to be cut lengthwise or removed and cut into discs. In addition to the parts which are always to be incised, incision is also necessary in the case of parts which were found to be diseased or suspicious during inspection or palpation. If the inspector finds pathological alterations the nature of which is not perfectly evident the carcass is retained for further examination. In case of extensive hemorrhage in the musculature of a leg it may be necessary to dissect the part in question in order to determine whether it is a simple hemorrhage from crushing or due to a bone fracture. In all cases the inspector should avoid unnecessary incision and dissection of the musculature,

for such cutting lowers the value of the meat. On the other hand, the meat should not be spared in cases where incision is required in order to reach a satisfactory decision. It is desirable that the inspector should follow a regular routine on each carcass in order that no part may be inadvertently overlooked.

In general the condition of the following parts is to be observed in inspection:

1. The blood.
2. The head and the upper cervical and submaxillary lymph glands (loosening the tongue so as to expose all the mucous membrane of the mouth and pharyngeal cavities).
3. The lungs and the lymph glands at the base of the lungs and in the mediastinum (a cross-section through the lower third of the lungs).
4. The pericardium and heart (a section opening both ventricles and cutting the septum).
5. The diaphragm.
6. The liver and lymph glands at the porta hepatis.
7. The stomach, intestines, mesentery, mesenteric glands and omentum.
8. The spleen.
9. The kidneys with their lymph glands and the bladder.
10. The uterus, vagina and vulva, especially if there be a vaginal discharge.
11. The udder and its lymph glands.
12. The musculature including its adipose and connective tissue, bones, joints, pleura and peritoneum. In doubtful cases it may be desirable to examine the lymph glands at the entrance to the chest (including the lower cervical glands), and the prescapular, axillary, lumbar, iliac, precrural, popliteal, ischiatic and superficial inguinal glands.

In cattle the tongue, heart, pterygoid and masseter muscles (the latter by a longitudinal section), and the other exposed muscle surfaces are to be inspected for cysticerci (Fig. 76). If there is reason for suspecting fluke worms, a section may be made across the main bile ducts, perpendicular to the gastric surface of the liver, and also through the bile ducts near the Spigelian lobe (Fig. 77). The kid-

neys are exposed by opening the fat capsule. In cows the uterus is opened by a cross-section.

Fig. 76.—Head of steer with tongue properly loosened.

The navel and joints of calves are to be examined and incised in suspected cases. Inspection of calves for cysticerci may be the same as in adult cattle, but may as well be omitted for calves under six

weeks of age. No inspection of the head or its glands, or the kidneys is necessary except in suspicious cases.

All swine except young roasting pigs are split in half before the inspection is completed. The muscles of the hams, belly, diaphragm, sides, neck, heart, tongue and larynx may be examined for cysticerci. An inspection of the split vertebræ will show whether or not the bones are affected with tuberculosis.

The liver of sheep should always be examined for flukes as recommended for beef livers. The heart and lymph glands of the head and lungs need not be examined unless suspicion is otherwise aroused.

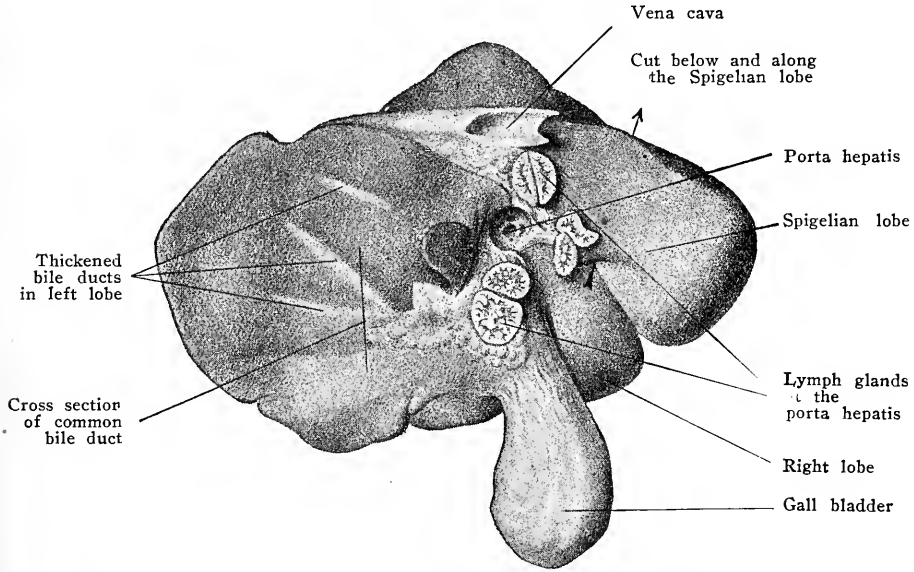


Fig. 77.—Gastric surface of bovine liver with exposed lymph glands, and indicated lines of direction for opening bile ducts.

The skin should receive some attention post mortem if ante-mortem inspection showed the presence of wounds, swellings, inflammation, suppuration or actinomycosis.

Conditions to be Especially Noted

1. The quantity, coloring, coagulability and foreign admixtures of the blood. The blood of diseased animals should not be allowed to produce unnecessary contamination of the abattoir.

2. In examining the head attention should be given to the detection of tumors (actinomycosis), alterations on the lips and mucous membranes of the mouth and pharyngeal cavities (calf diphtheria, necrosis), palpation of the tongue (actinomycosis, cysticerci), incision of the submaxillary and upper cervical lymph glands (tuberculosis, actinomycosis).

3. The lungs should be palpated and an incision made across the lower third to the branches of the trachea. The pulmonary and mediastinal lymph glands are to be incised (Fig. 7). The lungs are examined for inflammation, hemorrhagic septicemia, swine plague, tuberculosis and animal parasites, including echinococci, wandering flukes, and lung worms.

4. The pericardium is to be opened for examination of its inner surface (Fig. 34). The heart may be opened lengthwise from apex to base, but this is not necessary in sheep. The color and appearance of the heart musculature is to be noted for the purpose of detecting hemorrhages, cysticerci, echinococci and inflammation of the valves.

5. Both sides of the diaphragm and its muscular portion are to be examined for tuberculosis and cysticerci.

6. The liver is examined and palpated, and the lymph glands at the porta hepatis incised to detect changes of color or appearance, inflammation, purulent foci, flukes, echinococci, *Cysticercus tenuicollis*, pentastomes, tumors and tuberculosis.

7. The exterior and also the mucous membranes of the stomach and intestines are examined for tuberculosis, ulcers (stomach ulcers in calves, intestinal ulcers in other animals), inflammation. The mesentery and omentum are examined and the mesenteric glands incised (Figs. 12 to 14) for the purpose of detecting tuberculosis, anthrax, hemorrhages and animal parasites.

8. The spleen is palpated and, if nodules are found, it is incised from one end to the other. The chief alterations to be noted are swelling, anthrax, swine erysipelas, purulent foci, echinococci and tuberculosis.

9. The kidneys are examined with reference to their size, changes in color or appearance, inflammation, echinococci, tuberculosis (incision of renal glands). By external inspection of the bladder and by pressing out its contents it may be determined whether there is

any inflammation, thickening of the wall, or bloody or cloudy urine. If no pathological conditions are noted the bladder need not be incised.

10. The outside of the uterus is examined for enlargement, inflammation of the surrounding tissue, tuberculosis of the peritoneal covering. A cross-section through the body of the uterus will expose both the body and horns for inspection (Fig. 28). The chief pathological conditions to be noted are wounds, inflammation, collections of pus and exudate, tumors and tuberculosis. In suspected cases the vagina and vulva are to be incised and examined for wounds, inflammation and vesicular exanthema. The female reproductive organs should be closely examined in cases of recent parturition or vaginal discharge.

11. The udder is examined, palpated and incised if suspicion is entertained of the presence of inflammation, tumors, tuberculosis, or actinomycosis (in hogs). The supramammary lymph glands are incised for the detection of tuberculosis.

12. Muscles, adipose tissue, connective tissue, bones, joints, pleura and peritoneum. The whole musculature receives attention with reference to blood content, hemorrhages, collection of gas or watery fluids, tumors, and animal parasites. Superficial hemorrhages are investigated to determine whether they extend into the musculature. This may be done by careful incisions. The pleura and peritoneum are examined for blood content, inflammation, tumors and tuberculosis. The vertebral column, pelvic bones and sternum are examined for discoloration, fractures, myelitis, actinomycosis, and tuberculosis. If the generalization of tuberculosis by means of the blood system is suspected, the inspector examines the muscle lymph glands, including the lower cervical, prescapular, axillary, lumbar, iliac, precrural, popliteal, ischiatic, and superficial inguinal glands. A similar inspection is made for septicemia. If disease of a joint was noted ante mortem, the neighboring parts should be carefully examined post mortem.

VII

Nature and Characteristics of the Diseases and Defective Conditions of Most Importance in Meat Inspection

The defective conditions which may lead to retention or condemnation of meat may be due to natural causes such as immaturity, yellow food-coloration, food odor or sexual odor; diseases; post mortem changes in the meat; or intentional manipulation of the meat, e.g., inflation with air.

a. Objectionable Quality of Meat in Consequence of Natural Conditions

In this group fall immature animals, fetuses, emaciated animals, yellow discoloration of the fat tissue due to the food, and meat with repulsive odor or flavor.

1. Immaturity

Calves, lambs or pigs under three weeks of age are immature, and to be condemned. Immature animals have a poorly developed musculature, which is grayish red and infiltrated with water. Moreover, in calves immaturity may be recognized from the condition of the incisor teeth and the navel. As a rule calves are born with six incisor teeth, the corner incisors appearing about a week later. The gums covering the teeth of the new-born animal possess a bright red color. By the tenth day the gums have gradually lost their redness, receded from the incisors and assumed the usual ridge form. By the fifteenth day the middle incisors are free and at the age of twenty days only the corners are partly inclosed in the gums.

The stump of the umbilical cord becomes dry and black, and falls off during the second week, usually between the eighth and twelfth days. The healing and cicatrization of the navel wound occurs during the second and third weeks, and the contraction of the scar after four weeks. The skin of immature animals may be utilized but the carcass is condemned.

2. Fetuses

In slaughtering cows, quite frequently a fetus in advanced development is found. The hoofs of fetuses are soft and rounded, the umbilical ring and umbilical blood vessels are open. The musculature is soft, flabby and watery, the fat tissue gelatinous, the bone marrow red, the lungs brownish red, in state of collapse and heavier than water. All fetuses and still-born animals are condemned.

3. Emaciation

Emaciation consists in a wasting away of the fat tissue and muscle. As a rule it is a sequela of disease. In emaciated animals the prominent parts of the bones (ribs, iliac angle and ischiatic tuberosities) are conspicuous, the muscles are flat, the fat tissue has disappeared or become transformed into a yellowish, gelatinous mass. Distinction is made between incipient and extreme emaciation. In the latter form of emaciation the collapse of the musculature and the gelatinous modification of the adipose tissue are pronounced. The presence of extreme emaciation is of importance in reaching a judgment in cases of tuberculosis and certain other diseases. Carcasses showing a high degree of emaciation and a slimy degeneration of the fat tissue are condemned.

Poorness can be easily distinguished from emaciation. Milch cows, male breeding animals and animals in early stages of development or in old age are likely to be poor. They are characterized by deficiency of fat and by the firmness and dark red color of the musculature.

4. Yellow Color of the Fat Tissue Due to the Feed

In beef cattle fattened exclusively on pasture the fat tissue may assume a deep yellow color. The fat tissue alone shows the yellow

color. All other parts are of normal appearance and the usual color. The whole carcass of such animals is to be passed. This condition, however, is not to be confused with icterus. In icterus not only the fat tissue but also the viscera, fasciæ, cartilages, and even the muscles and bones, are discolored yellow.

5. Objectionable Odor and Flavor

An unusual odor and flavor may be observed in the meat of animals fed large rations of aromatic substances. The meat of hogs fed largely on fish and swill tastes and smells fishy, oily or rancid. In pronounced cases the odor may be very repulsive, and the fat tissue gray or yellow and soft. The meat of boars, buck goats, and occasionally of bulls, may have a peculiar, more or less striking or disagreeable odor and flavor, which largely disappear, however, in cooling. The objectionable odor is observed in about 20 per cent. of boars. The boar odor is like urine, the bull odor like leeks.

Aromatic drugs may lend their odor to the meat. This is particularly true of camphor, petroleum, ether, turpentine, cuminol, anise oil, chlorine preparations and carbolic acid. The last two, as also other disinfectants, affect the odor of the meat if the volatile parts are inhaled by the living animal. Meat may also absorb odors post mortem. Objectionable odors may also arise in cases of bloody urine, from exudates in the body and in certain diseases.

The odors mentioned above almost always disappear during the refrigeration of the meat, but may reappear in cooking. By means of a boiling test with a small piece of the meat it may be easily determined whether or not the odor will persist. It rarely occurs that the odor of meat is sufficient to cause its condemnation in the absence of other pathological conditions.

Carcasses of animals showing signs of preparation for parturition and carcasses of animals which have given birth to young within ten days before slaughter are condemned or rendered into tallow.

b. Diseases of Food Animals

GENERAL CONSIDERATIONS

Abnormal conditions in certain parts of the body may be of congenital origin. Such irregularities of structures are commonly called

malformations. In food animals doubling of parts is the commonest example of this condition. Malformations such as double spleen or double liver are of little importance from the standpoint of meat inspection. Malformed parts are passed if the color, appearance and consistency are normal.

In ruptures of viscera and muscles and fractures of bones there are two points to be considered. With all such cases of solution of continuity hemorrhages are associated which affect the surrounding meat. Secondly, in ruptures of soft parts which are in connection with the outside world (injuries to the skin, intestine, lungs and urinogenital apparatus), and in bone fractures associated with rupture of the skin, inflammation may arise leading to septicemia. In such cases it must be determined whether or not septicemia is present, for it cannot be considered as out of the question unless slaughter took place immediately after the injury.

Hemorrhages. The escape of blood from the blood vessels into the tissues or body cavities takes place mechanically (injury of one or more blood vessels by cuts, stabs, bruises, ruptures, fractures), or as a result of other general causes.

Recent hemorrhages from mechanical causes are to be recognized from the fact that merely the musculature and connective tissue are permeated to some extent with dark red blood without disagreeable odor.

Hemorrhages of non-mechanical origin occur most frequently in diseases of the blood (septicemia, anthrax, blackleg, hemorrhagic septicemia). They may be either small and circumscribed or extensive, and occur most frequently on the mucous and serous membranes, particularly on the pleura, under the epicardium and endocardium (Fig. 78), in the kidneys and in the cutis and subcutis.

Hemorrhages of mechanical origin cause the condemnation merely of the affected parts; other parts are passed. The whole carcass is condemned if the hemorrhages are due to septicemia, anthrax, blackleg or hemorrhagic septicemia. The red spots which occur on certain parts of the heart of perfectly healthy animals should not be confused with the punctate or linear hemorrhages under the endocardium (Fig. 79). These red spots are to be seen on the papillary muscles and are due to the contraction of the heart muscle. They are to be

distinguished from the above-mentioned hemorrhages by their more circular form, their occurrence exclusively on the papillary muscles, and by the fact that no other symptoms of disease are present.

The teratological disappearance of an organ or muscle is of little importance to the inspector. Enlarged parts are passed if the structure is otherwise unaltered. Such enlargement sometimes occurs in one kidney as a result of the absence or diseased condition of the other kidney.

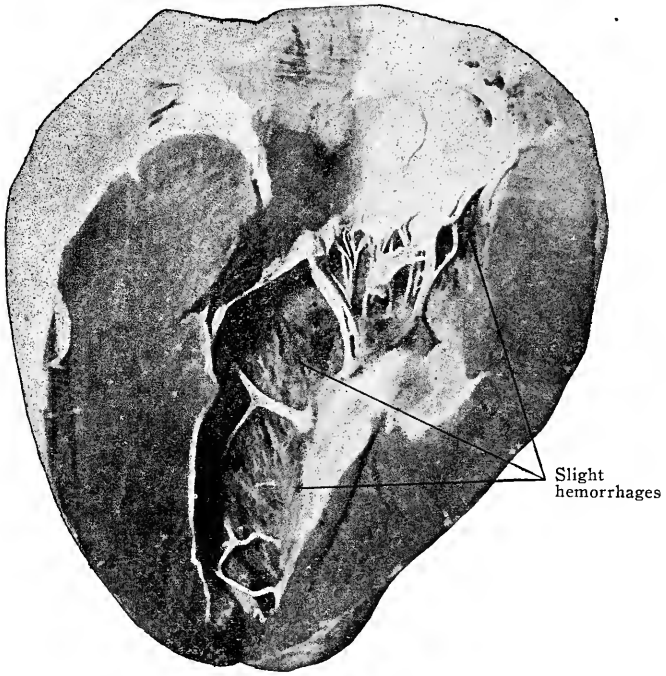


Fig. 78.—Heart with hemorrhages under the endocardium of a steer affected with septicemia.

Deposits of coloring matter in viscera may lead to condemnation. Melanosis occurs in the belly bacon of swine and in the lungs and liver of calves, affected organs showing black spots (Fig. 80). Furthermore, a brown color is sometimes observed in the bones and a liver color in the muscles. Deposits of lime may also occur in certain organs.

Discolorations (alteration of the natural color to greenish brown, grayish red or grayish yellow) and cloudiness (loss of sheen) of the liver, heart muscle and kidneys, like hemorrhages of non-mechanical origin in various parts of the body, are evidences of the presence of serious disease to be definitely identified by observing the other symptoms.

Inflammations of food animals are characterized by swelling, redness and the formation of inflammatory products. On the skin and

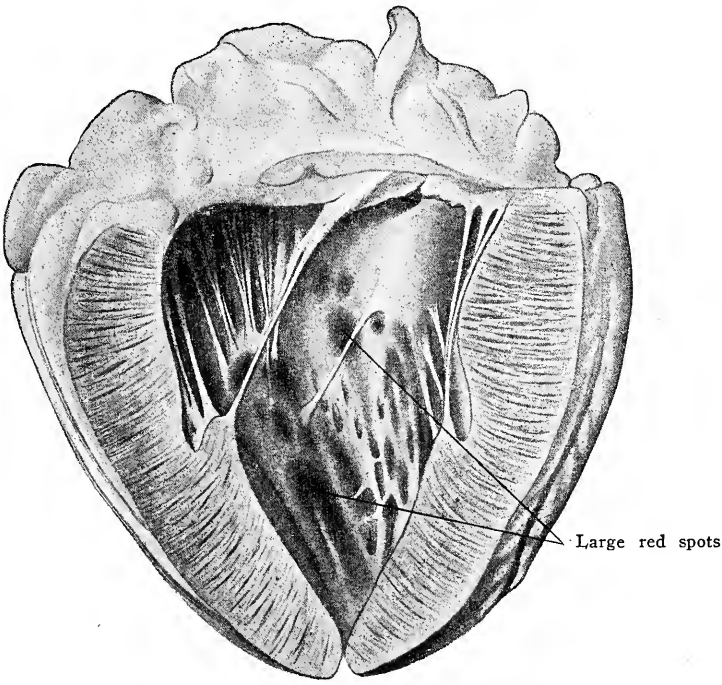


Fig. 79.—Healthy beef heart with large red spots in myocardium.

mucous membranes a thin, watery fluid may be observed, or mucus and pus. Moreover, cloudy yellow deposits may form on the mucous membranes, and cloudy yellow squamæ in the mucous membranes. Desquamation takes place, leaving ulcers (areas on which the mucous membrane is wanting). The ulcers may become cicatrized. In bloody inflammation the mucous membranes become strongly reddened and filled with hemorrhages, the contents of the intestines being bloody in

bloody enteritis. During the continuance of inflammation watery, bloody and bloody-watery exudations collect in the connective tissue and musculature. The pus foci may be completely walled in by firm, tough, white capsules (encapsulated pus foci). A special form of inflammation in tissues leads to induration by the new formation of connective tissue. On the serous membranes (pleura and peritoneum) inflammation causes the formation of watery, purulent or puriform exudates or scalelike yellow incrustations, which bring about adhesions between the viscera. From these adhesions coalescence may later arise by the formation of connective tissue, which must be cut through with a knife. Inflammatory foci or affected parts may be removed and the rest of the carcass passed, or the whole carcass may have to

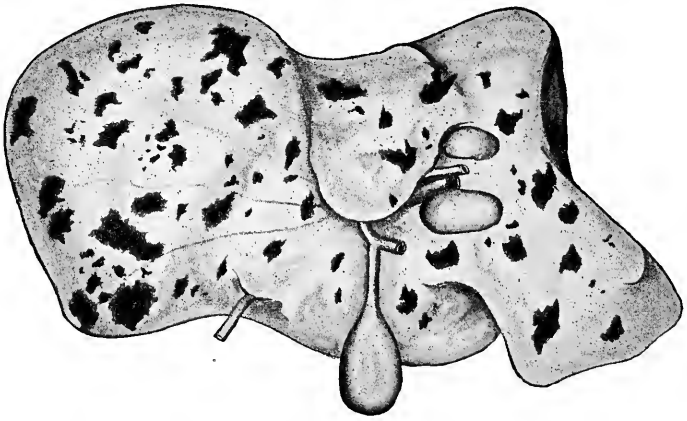


Fig. 80.—Deposition of pigment in the liver of a calf.

be condemned, depending on the nature and extent of the disease which causes the inflammation.

Tumors are nodular neomorphic structures which arise in the viscera without inflammation or other demonstrable cause. Tumor-like structures of microbic origin such as the tubercles of tuberculosis, actinomycosis, etc., are not classed with the tumors, but with the infectious neomorphs.

Distinction is made between benign and malignant tumors. The former show no tendency toward extension to other organs, while malignant tumors extend by proliferation into the surrounding tis-

sues, and are often distributed throughout the body by the blood and lymph. A tumor is said to be local when it affects only one part of the body including or not the corresponding lymph glands. Parts affected with local tumors are condemned, the rest of the carcass being passed.

CLASSIFICATION OF DISEASES

The diseases of food animals may be classified as: I, local diseases; II, blood diseases; III, intoxications; IV, parasitic diseases; and, V, infectious diseases.

I.—LOCAL DISEASES OF INDIVIDUAL PARTS OF THE BODY INCLUDING LOCALIZED LESIONS OF GENERAL DISEASES

Local or organic diseases may occur on the skin, under the skin, in the respiratory, digestive or urinogenital apparatus, in the blood, lymph or nervous system, in the bones and in the muscles.

1. Cutis and Subcutis

Simple dermal inflammations without the extensive formation of pus or ichor are unimportant diseases. Inflammations in connection with skin wounds may be of the simple kind. The whole skin of hogs and the head skin of calves are used as food. If these parts are inflamed, they are condemned and removed. Dermal wounds, and also dermal inflammations, followed with extensive formation of pus and ichor, are serious affections. Slight skin wounds acquire great importance if the inflammatory process extends from the skin into the deeper lying parts—joints, sheaths of tendons, abdominal and thoracic cavities. In all such cases the general health is greatly affected.

Redness of the skin of hogs is of some importance. It may be due to external agents such as blows, cold and heat, in which cases it is a mere local alteration. Affected hogs are rarely rendered unfit for food from these causes. If hogs are allowed to pass into the scalding vat alive the whole skin is reddened. Such carcasses are condemned.

Red coloration of the skin may also be a symptom of swine erysipelas or hog cholera. In young pigs black, pitchy or sooty scabs may occur on the skin. This is one of the external symptoms of hog cholera or swine plague, but is sometimes called pitchy mange.

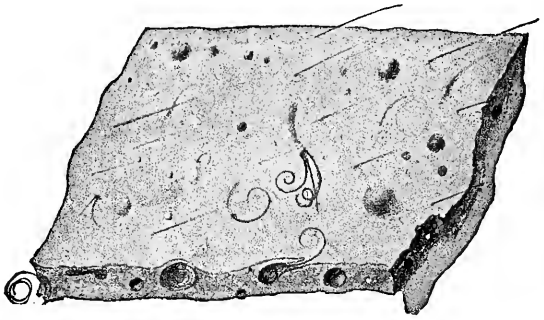


Fig. 81.—Piece of hog skin with granular eruption.

Granular eruption is a special skin disease of hogs. It appears in the form of round tubercles in the skin. The tubercles vary in size

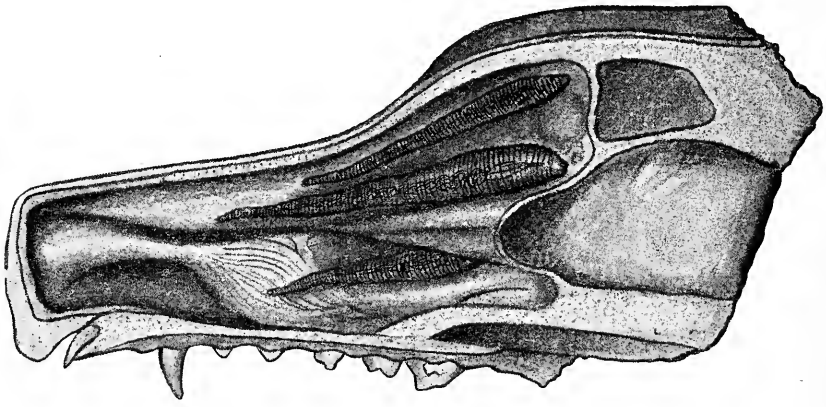


Fig. 82.—Median section of dog head with tapeworm-like pentastomes.

from a hemp seed to a pea, and are often black, resembling shot. Coiled hairs are found in the tubercles (Fig 81). Affected parts of the skin may be removed.

Furthermore, in cases of scabies, scales and scabs may occur on the skin of the body, and in foot-and-mouth disease there are vesicles and superficial ulcers on the hoofs. Fluids collect under the skin in general dropsy and in cardiac weakness. As a result of injury to the urethra urine may collect in the neighboring skin. Hemorrhagic tumors form in the subcutis in cases of anthrax and blackleg, with gas formation in the latter disease. In hemorrhagic septicemia collections of colorless or blackish red fluid may be found under the skin of the head and neck. In actinomycosis tumors develop under the skin of the head and neck of cattle and the udder of hogs. These tumors may break through to the surface, appearing like fungoid proliferations. Occasionally a black coloration is observed in the fat tissue under the skin of the belly of hogs.

2. Respiratory Apparatus

(a) *Nostrils, Larynx, Trachea*

An examination of the nasal mucosa is necessary only in animals in which during life pathological symptoms were present indicating the involvement of these structures, *e.g.*, discharges or abnormal respiratory sounds. These symptoms appear in cattle affected with malignant catarrhal fever, in hogs affected with snuffles, and in sheep affected with malignant catarrhal fever or sheep bots. The mucosa of the larynx and trachea is seldom diseased unless the nasal mucosa and lungs are also affected. Animals which have been exposed to the action of irritating gases may exhibit pronounced inflammation of the laryngeal and tracheal mucosa. The same condition is found in malignant catarrhal fever. In pulmonary tuberculosis tuberculous ulcers are often found in and under the mucous membranes of the larynx and trachea. Actinomycotic tumors also appear in the mucosa of the larynx.

(b) *Lungs*

The lungs of calves may exhibit a black coloration. The blood may be unequally distributed, one lung being dark and the other light colored (slaughtered downers). Hemorrhages occur under the pulmonary pleura in cases of asphyxia and septicemia.

Pulmonary inflammations occur in all food animals: in cattle as a symptom of non-contagious pneumonia, hemorrhagic septicemia and penetration of foreign bodies; in hogs as a characteristic symptom of swine plague (Fig. 83); in calves, sheep and goats after infestation with lung worms. Sheep and goats are also susceptible to a contagious pneumonia.

Diseased lobes of lungs

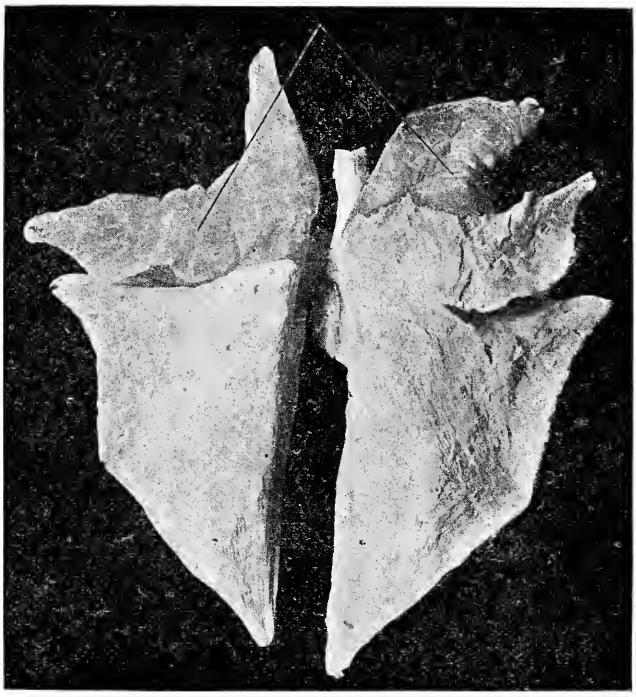


Fig. 83.—Hog lungs with inflammation of anterior lobes as a result of chronic swine plague.

Affected parts of the lungs do not collapse (Fig. 83), are reddened (the color varying from dark to grayish red), and the consistency is firm, like that of the liver. If the pleura is simultaneously affected, fluid may collect in the chest cavity, and deposits may form on the pleural membranes, leading to adhesion between the lungs and costal pleura. The deposits may be easily removed. From the ad-

hesion a complete coalescence may arise, making it necessary to use the knife in removing the lungs from the chest.

Foreign bodies and lung worms may also cause inflammatory conditions of some importance. In such cases the foci are usually limited and the cause apparent.

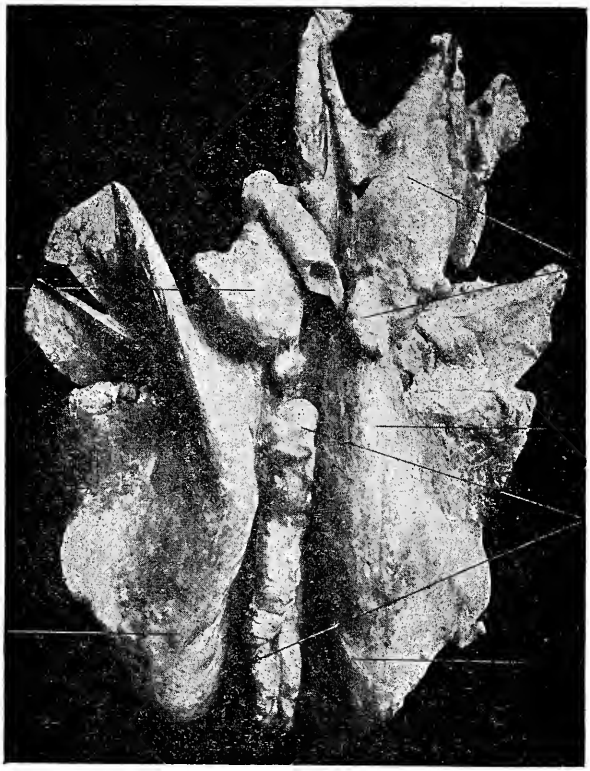


Fig. 84.—Beef lungs with respiratory tuberculosis. The bronchial and mediastinal glands are greatly enlarged and filled with tuberculous foci. At points on the lung surface indicated by *a* there are tubercles which are found to be soft on section.

An ichorous inflammation of the lungs may arise after the formation of exudates and in connection with the above-mentioned inflammations. In such cases there may be cavities in the lungs filled with stinking pus. Tumors, and the alterations of tuberculosis, actinomycosis and botryomycosis may also be found in the lungs.

Tuberculosis appears in the lungs either in the form of small round tubercles of gray or yellow color and firm consistency, or in the form of larger nodules containing pus cavities in connection with the branches of the trachea (Fig. 84). Moreover, the surface of the

Fig. 85.—Beef lungs with tuberculous foci on the pleura (pearl disease). Great alteration of the anterior and posterior mediastinal glands.

lungs or pulmonary pleura is often covered with gray and yellow tubercles and larger nodules or pearl nodules (Fig. 85).

Among animal parasites various species of lung worms are found in the lungs of ruminants and swine, and also echinococci, wandering flukes, and occasionally *Cysticercus tenuicollis*. The liver flukes which have wandered into the lungs lie in hazel or walnut-sized cavi-

ties, with a tough, connective tissue wall and dark-brown oily contents.

During slaughter the lungs may become contaminated with stomach contents and blood. Especially in slaughter by the Jewish method the stomach contents may be drawn into the lungs through the severed trachea from the end of the severed esophagus. A section of the air passages below the bifurcation of the trachea will disclose the stomach contents. If desired, this material may be easily removed by washing. Red spots in the lungs due to blood aspiration do not feel firm. Blood aspiration may be distinguished from hypostasis from the fact that in the former the red color occurs in spots.

(c) *Pleura*

As a rule, the pleura is diseased only when the lungs are affected. Thus pleurisy is often associated with pneumonia. In pleuritis the

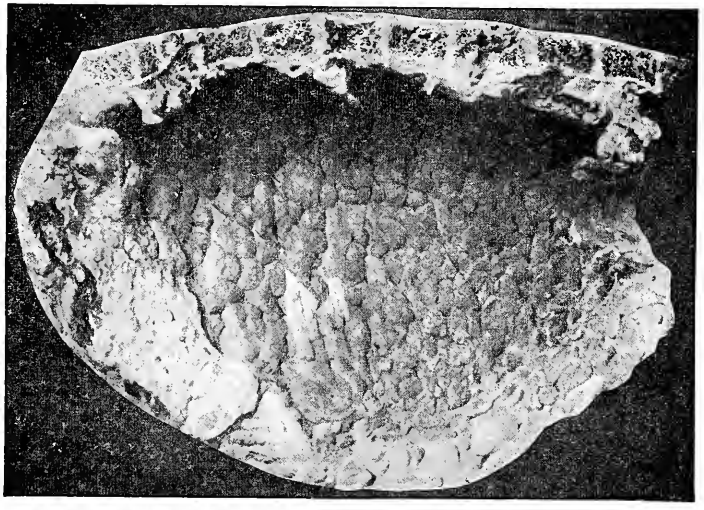


Fig. 86.—Right half of thorax of beef with tuberculosis of the pleura.

pleura is often covered with false membranes, which may be pulled off. Moreover, in the thoracic cavity there may be a collection of yellow, odorless or stinking fluid, in which float portions of membranes like those on the pleura. Adhesions between the lungs and the

pleura often persist after recovery from pleurisy. Following fracture of the ribs, circumscribed adhesions frequently form in the region of the fracture. Furthermore, tuberculous alterations occur on the pleura in the form of tubercles and nodules (Fig. 86). These are chiefly found in the angles between the ribs and diaphragm. In inspection, the diaphragm is to be pulled away so as to expose these points. Tuberculous alterations may be present on the pleura without the lungs being involved.

3. Digestive Apparatus

(a) *Mucous Membrane of the Mouth and the Tongue*

The vesicles and superficial ulcers of foot and mouth disease appear on the mucous membrane of the mouth in cattle and hogs, less often in sheep and goats. Inflammation may also be observed as a result of the action of irritant drugs and in cases of calf diphtheria. The mucosa is swollen, reddened and spotted with gray and grayish yellow. The discolored spots desquamate, leaving ulcers. Mercuric poisoning produces ulcers on the mucosa of the mouth in cattle. In cases of hemorrhagic septicemia the tongue may become enlarged to five times its natural size.

Actinomycosis may affect the mucosa of the mouth and also the tongue. It occurs in three forms: as superficial ulcers, as mushroom-like nodules projecting above the surface, and in the form of deep-lying nodules and thickenings (Fig. 89). Actinomycotic thickening of the tongue is called wooden tongue, since the tongue acquires the consistency of wood. The disease appears most frequently at the boundary line between the body and tip of the tongue (Fig. 87, *a*). In cattle this point is always to be examined for actinomycosis. The actinomycotic lesion at this point is characterized by the presence of a small ulcer, in which hairs and particles of the feed may be observed (Fig. 88).

Tuberculosis may occur in the lymph glands belonging to the mucous membranes of the mouth and tongue (submaxillary and pharyngeal glands). The glands become enlarged and filled with casefied and calcified foci. In hogs the submaxillary glands are chiefly affected, in cattle the pharyngeal glands (Fig. 91). Occasionally an

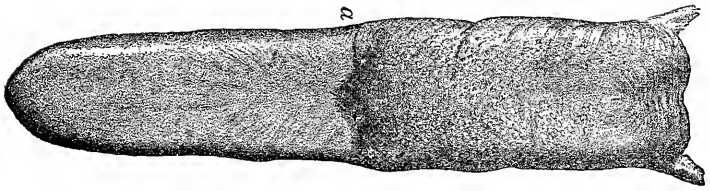


Fig. 87.—Beef tongue with actinomycosis at the line between the body and tip of tongue (a).

Fig. 88.—Section through the affected part of Fig. 87.

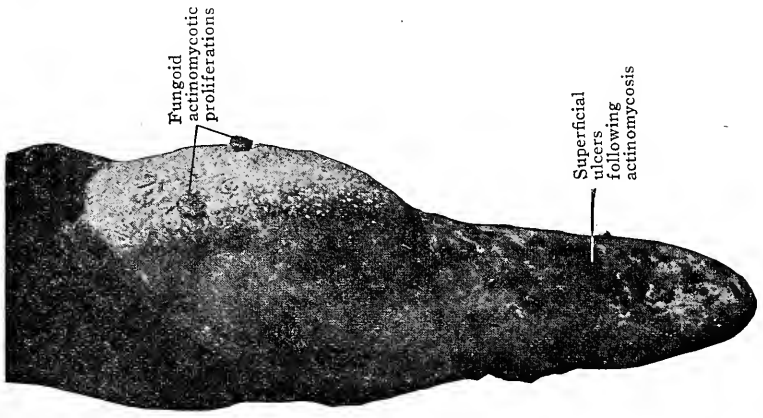


Fig. 89.—Wooden tongue of beef with fungoid proliferations and superficial ulcers.

enlargement and induration of the submaxillary and pharyngeal glands are seen in cases of actinomycosis. In such cases the glands exhibit minute yellow foci on cross-section.

(b) *Mucosa of the Pharynx*

Bloody and bloody-watery exudations may occur under the mucosa of the pharynx in anthrax, hemorrhagic septicemia and swine erysipelas.

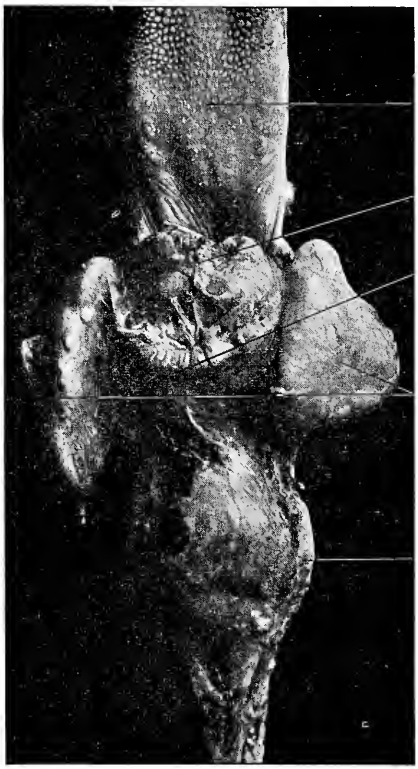


Fig. 91.—Tuberculosis of the pharyngeal glands and tonsils of the beef

(c) *Esophagus*

Occasionally one observes local tumors (wartlike proliferations) on the mucosa of the esophagus, also larvæ of the warble-fly in the

muscular layer in cattle (Fig. 90), and Miescher's sacs in sheep and goats (Fig. 92).

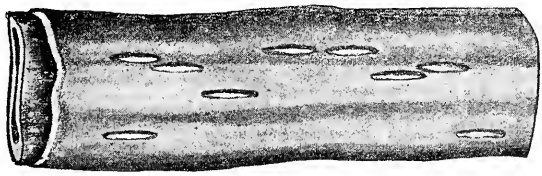


Fig. 90.—Beef esophagus with young larvæ of warble fly.

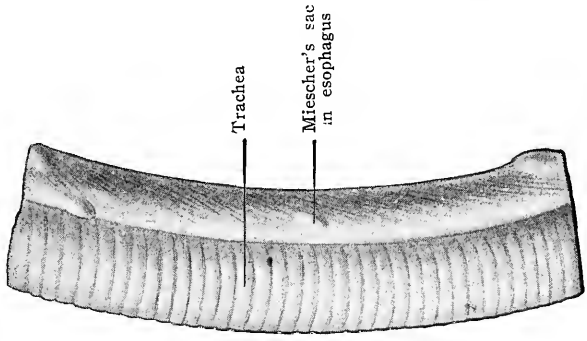


Fig. 92.—Miescher's sacs in the esophagus of the sheep.

(d) *Stomach and Intestines*

The mucosa of the stomach and intestines may be moderately swollen and covered with mucus in cases of catarrh, while in gastritis and enteritis it may be greatly swollen and reddened or covered with false membranes and scales or even ulcers. Inflammatory reddening should not be confused with the digestive congestion of one circumscribed area of the gastric mucous membrane in hogs.

Quite frequently foreign bodies are found in the second stomach of cattle, either lying loose in the stomach cavity or penetrating through the wall. A foreign body may produce a tubular wound, with formation of stinking pus. It may reach the pericardium and may also cause peritonitis.

Gastric ulcers are observed with relative frequency in calves, the mucous membrane being completely destroyed to a greater or less depth. Peritonitis, together with the collection of stinking material in the body cavity, follows the development of a perforating ulcer.

In the stomach and intestines various animal parasites occur, especially round worms and tape worms. In themselves they have no importance for meat inspection, since they are removed in cleaning the intestines. They may, however, lead to the development of emaciation, dropsy, and other general disturbances.

Frequently small tubercles of the size of hemp seeds or peas, with greenish caseous contents, are found in the intestinal wall of cattle.

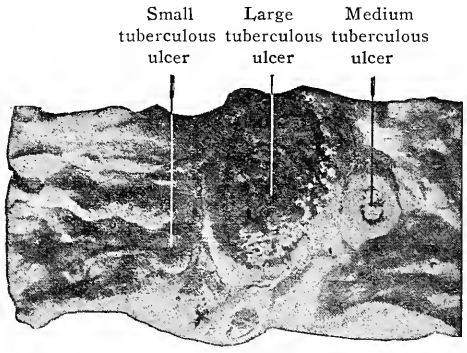


Fig. 93.—Portion of beef intestine with tuberculous ulcers.

These tubercles are caused by harmless round worms, but if present in large numbers may render the intestines unfit for sausage casings.

In cases of tuberculosis, gray, yellow, grayish yellow, and grayish red tubercules may appear upon the outer covering of the stomach and intestines, and also ulcers in the mucosa of the intestines. The latter vary in size from a lentil to a bean or larger, the base is rough, and the ulcer is surrounded by a raised ridge (Fig. 93). In intestinal tuberculosis the mesenteric glands are always enlarged and filled with gray and yellow tubercles. Frequently, however, the mesenteric glands are tuberculous in the absence of demonstrable tuberculous lesions in the intestines.

(e) *Peritoneum*

The most important alterations in the peritoneum are gray, yellow or grayish-yellow tubercles in tuberculosis; also grayish red, firmly attached membranes in tuberculosis and inflammations accompanied with the collection of pus or stinking watery exudates in the

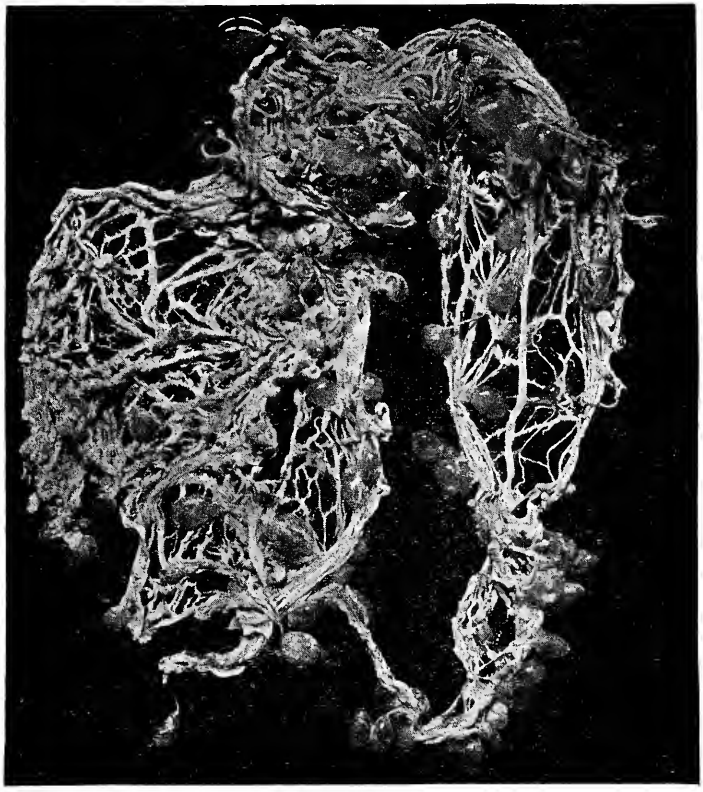


Fig. 94.—Omentum of hog with Cysticercus tenuicollis.

body cavity, or with yellow, easily separable membranous deposits upon the viscera. Connective tissue adhesions may occur between viscera without the formation of pus or with encapsulated pus foci.

Accumulations of gas in the form of vesicles is observed in the mesentery of swine (mesenteric emphysema or air-bladder mesentery).

The general health of the animal is not thereby disturbed. Affected parts may be easily removed. *Cysticercus tenuicollis* is found under the peritoneum, in the mesentery and omentum (Fig. 94).

Liver.—The usual lobulation is sometimes wanting in the liver of hogs. Double livers may also occur. These malformations do not affect the wholesomeness of the liver, since they are not associated with any other alteration of the organ. Occasionally bluish-red or violet spots are observed under the surface of the liver and extending into its substance. They affect the market price but not the wholesomeness of the organ. A black coloration may occur in the liver of calves, rendering it unfit for food.

Ruptures may occur in the liver of very fat animals, especially lambs, usually leading to death from hemorrhage. The liver is yellow in cases of icterus. Discoloration and cloudiness of the liver, associated with hemorrhages, are very important symptoms of serious general diseases. In the beef liver dry gangrene is observed in the form of cloudy, sharply delimited areas of gray color. In time the gangrenous foci soften, become purulent, and finally are completely encapsulated. As a result of inflammation, the liver may lose its normal consistency and become firm, tough, and indurated. The affected parts of the liver are condemned.

Furthermore, tumors may occur in the liver, and also tuberculous and actinomycotic neomorphs. The most frequent pathological findings in the liver, however, are animal parasites (echinococci, flukes, *Cysticercus tenuicollis*, and pentastomes). The flukes are located in the bile-ducts and cause enlargement and thickening of these structures. Wandering ascarid worms are sometimes found in the bile-ducts of hogs.

Pancreas.—Alterations in the pancreas are rare. Occasionally tumors are observed in the organ, and calculi in the pancreatic duct.

4. Genito-Urinary Apparatus

(a) *The Kidneys*

A form of malformation observed in the kidneys consists in the atrophy of one and the enlargement of the other kidney. The kidneys may also grow together. These malformations are of little im-

portance in meat inspection. Cloudiness of the surface and cortex of the kidneys has the same significance as cloudiness of the liver. The same is true for small hemorrhages in the kidneys.

Several forms of inflammation occur in the kidneys. Recent inflammation may be recognized from the fact that the kidneys are enlarged, cloudy, and softer than usual. As a rule, such fresh inflammations accompany serious general diseases. The same is true of purulent renal inflammation, in which small, white or yellow pus foci form in the renal cortex, surrounded by a red area. Inflammation of the renal pelvis may arise from extension of an infection upward from the bladder. It may be recognized from the distension of the ureters and renal pelvis, which are enlarged and filled with pus and mucus.

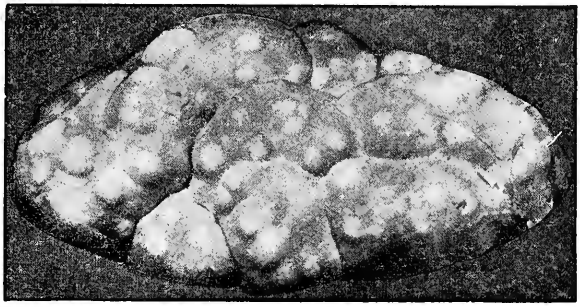


Fig. 95.—Spotted kidney in the calf.

In calves, round or conical white nodules without surrounding red area occur in the cortex of the kidneys (Spotted kidney, Fig. 95). This condition may or may not be connected with general disturbance of health.

Mention may also be made of contractions in the cortex and medulla of the kidneys, accompanied with the formation of white streaks or scars. In small numbers they are of no importance, but in large numbers they may render the kidneys unfit for food.

Furthermore, tumors and tuberculous alterations occur in the kidneys. The latter are to be recognized by the appearance of small gray or yellow tubercles and larger yellow casefied and calcified nodules. In tuberculosis, a large part of the beef kidney may be transformed into a yellow caseous focus.

(b) *Bladder and Urethra*

Calculi may collect in the bladder (cystic calculi), and in male animals, especially in steers and wethers, may obstruct the urethra. Rupture of the bladder follows, or necrosis of the urethra in the region of the retained calculus. Urine passes into the subcutis through the necrotic tissue. In either case bloody urine is observed, and a pronounced urinous odor in the meat, which is, therefore, unfit for food.

Cystitis is to be recognized by the swelling and reddening of the mucosa of the bladder, formation of squamæ and ulcers, as also by the cloudiness and foul odor of the urine.

(c) *Male Sexual Organs*

Tuberculosis may occur in bull and boar testicles. Tuberculous testicles are enlarged and exhibit yellow caseous pits, or are transformed into a yellow caseous mass. The superficial inguinal glands are also affected.

(d) *Female Sexual Organs*

Pathological alterations may occur in the ovaries, oviducts, uterus, vagina, and udder. The most important alterations are those of the uterus, vagina, and udder.

The most frequent alterations of the ovaries and oviducts are of tuberculous nature, being connected with tuberculosis of the peritoneum.

Shrunken or mummified fetuses may be found in the uterus. If the mummified fetuses lie in an odorless fluid, are hard as stone, and if the general condition of health is not affected, the carcass is passed.

If decomposing fetuses are found lying in a stinking fluid and are bloated with gases of decomposition, septicemia may be suspected. The same is true for all cases of wounds of the uterus, inflammation accompanied with swelling and reddening of the uterine mucosa and with the formation of squamæ and ulcers; and for retention of the afterbirth. Tumors in the uterus and under the uterine mucosa do not affect the wholesomeness of the meat.

Finally, tuberculosis should be mentioned as a frequent disease of the uterus in cows. Uterine tuberculosis occurs in three forms: formation of ulcers and tubercles in and under the uterine mucosa; merely tubercles under the mucosa; and tubercles upon the outer covering of the uterus and in the uterine wall. The last form is connected with tuberculosis of the peritoneum.

The mucosa of the vagina may exhibit vesicles of the size of peas or larger, with cloudy purulent contents and superficial ulcers (vesicular eruption). These lesions do not affect the carcass.

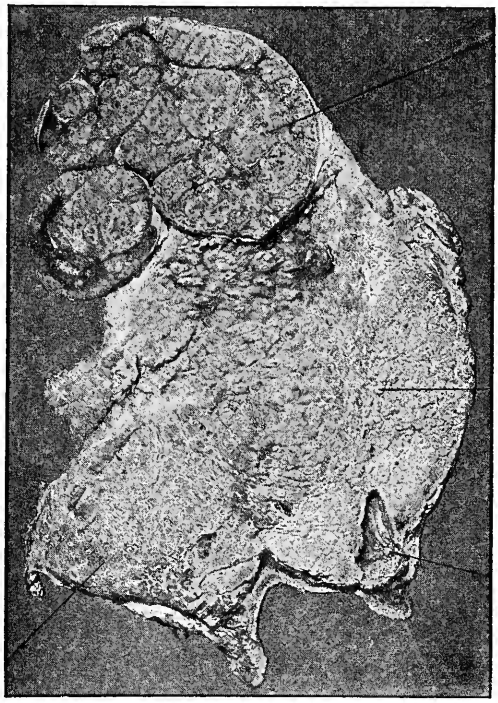


Fig. 96.—Tuberculous udder of cow.

Udder.—In the udder the inflammatory lesions of tuberculosis and actinomycosis are of interest. The udder and supramammary lymph-glands are swollen, the swelling affecting all quarters uniformly or only one or more quarters. A watery fluid containing flakes is obtained from the teats. These conditions may be associated with septicemia

or other general diseases, rendering condemnation necessary. Simple mammitis may run its course, leaving the affected parts of the udder indurated.

In mammary tuberculosis one or more quarters of the udder are enlarged, and uniformly firm or with nodules. Simultaneously the corresponding lymph-glands are swollen, full of liquid, and with casefied or calcified tubercles or nodules. On cross-section the affected quarters of the udder do not show the usual yellow color of the mammary tissue, but a grayish red color and a varying number of conspicuous, grayish-yellow, casefied and calcified tubercles. In the swine, udder tuberculosis is relatively rare as compared with antinomycosis. The latter disease results in the formation of nodules and pus foci in the udder. These nodules are tough and filled with small yellow tubercles. The pus foci contain yellow or grayish-green pus. The nodules and pus foci may break through to the surface. The supramammary glands are swollen and watery on cross-section. In addition to the above-mentioned diseases, simple tumors may occur in the udder.

5. Circulatory Apparatus

The pericardium, epicardium, myocardium, and endocardium may be affected with special diseases.

Hemorrhages in the form of spots, points, and streaks may appear on the pericardium and epicardium in various infectious diseases and in septicemia. The epicardium is often spotted with black or red in cases of anthrax. Inflammation appears in the pericardium of cattle as a result of injury from foreign bodies which have penetrated through the second stomach. In such cases the pericardium is distended with a stinking fluid, and its inner surface, as well as the epicardium, is covered with a yellow, separable, omelet-like deposit. Moreover, in cases of pneumonia accompanied with pleurisy, the pericardium may also be affected. Pericardial inflammation may lead to connective tissue adhesions between the heart and pericardium, requiring a knife to separate the pericardium. Adhesions without suppuration or effusions are not of serious consequence.

Tuberculous alterations may occur in and upon the pericardium. Like tuberculous lesions on the pleura and peritoneum, they appear as grayish-red proliferations on the surface (Fig. 97), developing later into small tubercles or larger rough nodules (Fig. 86).

In general infectious diseases and in septicemia the heart muscle may be cloudy, grayish-red and softer than normally. Furthermore,

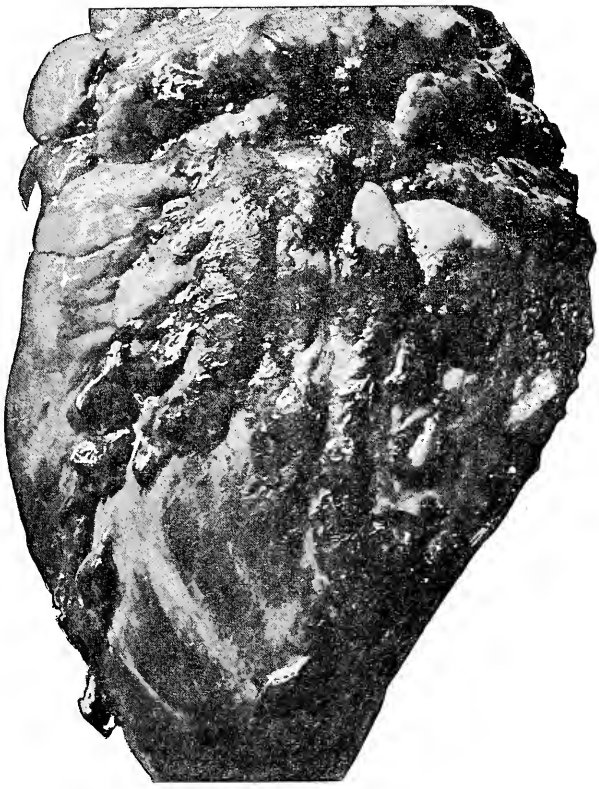
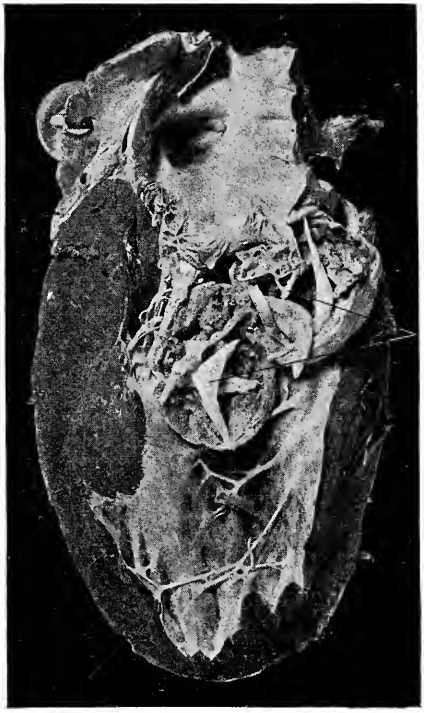


Fig. 97.—Heart with tuberculous proliferations on the outer surface.

one may find in the heart muscle pus foci, tuberculous alterations, echinococci, and cysticerci.

Petechiæ occur under the endocardium (Fig. 78) under the same conditions as in the epicardium. These should not be confused with normal red spots of the papillary muscles. Inflammation of the car-



The two halves of a sectioned echinococcus

Fig. 98.—Heart with echinococci.

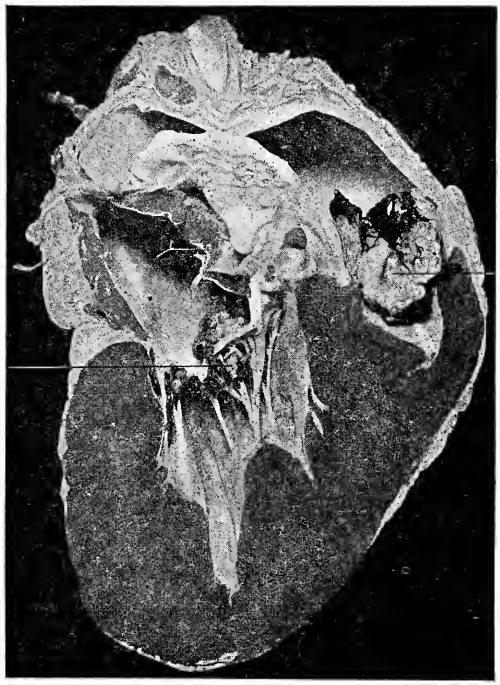


Fig. 99.—Hog heart with proliferations on the valves following swine erysipelas.

diac valves may lead to the formation of tumors and ulcers, thus obstructing the movement of the blood. A tumor-producing inflammation is observed in cases of swine erysipelas (Fig. 99). Ulcerous inflammation of the cardiac valves with deposition of clotted blood upon the ulcers is seen in septicemia. Simple tumors may occur in all parts of the heart.

6. Lymph Glands

The lymph glands act as filters, purifying the lymph before its entrance into the blood circulation. If the lymph carries pathogenic bacteria or some other cause of inflammation the glands become swollen and inflamed. On cross-section of inflamed glands an abundance of fluid escapes and hemorrhages may be seen. The lymph glands are regularly affected in case of inflammation of the part or organ from which they receive their lymph. Swelling of all the lymph glands is an indication of septicemia or fresh, hematogenous infection with tuberculosis.

If a certain part of the body is affected with tuberculosis the corresponding lymph glands are also involved. Tuberculosis of the lymph glands is characterized by swelling and the appearance of small tubercles, which later casefy, calcify and unite into large nodules in the interior of the gland.

Swelling may also appear in actinomycosis, the gland becoming rough and tougher than normally. On cross-section through the enlarged glands yellow, punctiform deposits are observed (colonies of actinomyces). The lymph glands may become casefied in hog cholera and in caseous lymph-adenitis of sheep.

In leukemia the lymph glands may become enlarged to the size of the fist or head, and are abnormally soft.

Among the animal parasites, pentastomes may be found, especially in the mesenteric glands, and also cysticerci, echinococci and fluke worms.

7. The Spleen

The capsule of the spleen may exhibit the same alterations as the peritoneum. In tuberculosis the splenic capsule may be more extensively affected than the rest of the peritoneum. Malignant tumors occur in the spleen, and also pus foci in purulent septicemia and ichorous foci in puriform septicemia. In hematogenous tuberculosis tubercles appear in the spleen. Echinococci, wandering liver flukes and pentastomes are also found in the spleen. Swelling of the spleen is of great importance. It occurs in anthrax and swine erysipelas.

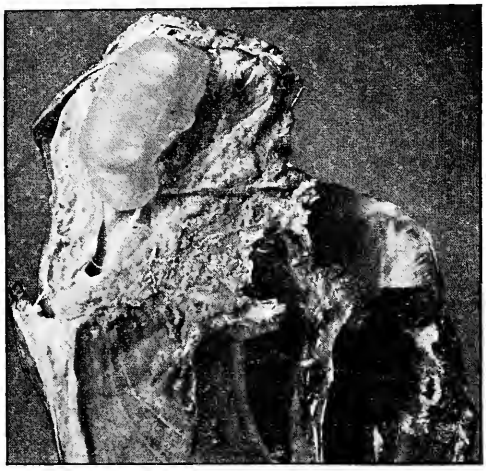


Fig. 100.—Section through sheep brain showing gid worm. (The gid worm projects from the middle of the sectioned brain.)

8. The Nervous System

(a) *Brain and Spinal Cord*

The membranes of the brain may be inflamed (meningitis). The meninges become reddened, and in purulent meningitis are covered with pus. Tuberculous alterations may also occur in the brain in the form of small tubercles. The gid worm (Fig. 100) is found in the brain, and occasionally echinococci and cysticerci. Serious brain affections may be suspected from the behavior of the animal during life.

(b) *The Nerves*

Tumors in the form of soft-firm nodules or tubercles occur on the nerves.

9. The Skeleton

Swellings due to rachitis and abnormal softness or osteomalacia are observed in the bones. In osteomalacia the marrow cavity is enlarged and filled with a fluid, yellow marrow. Liquefaction and suppuration of the bone marrow may occur in pyemia.

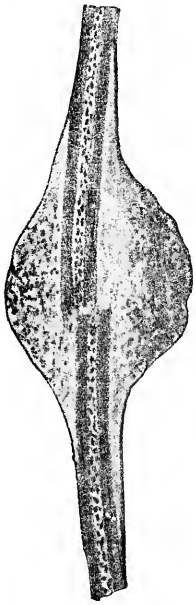


Fig. 101.—Thickening of rib following fracture.

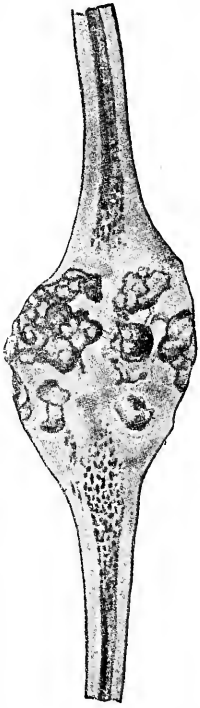


Fig. 102.—Thickening of rib following tuberculosis.

The most frequent alterations of the bones are fractures of the leg bones, ribs and vertebræ. Fractures of the leg bones produce extreme lameness; the animal cannot put any weight on the broken leg. Vertebral fractures produce lameness, the animal being unable

to rise with the affected quarters. In the region of the fractures hemorrhages form and penetrate in the connective tissue between the muscles to the surface of the body. It should always be remembered, therefore, that hemorrhages on the surface of the carcass may come from bone fractures. Distinction is made between simple and compound fractures. In the latter the skin may be torn and slivers of bone may protrude through the wound. Parts which have thus be-

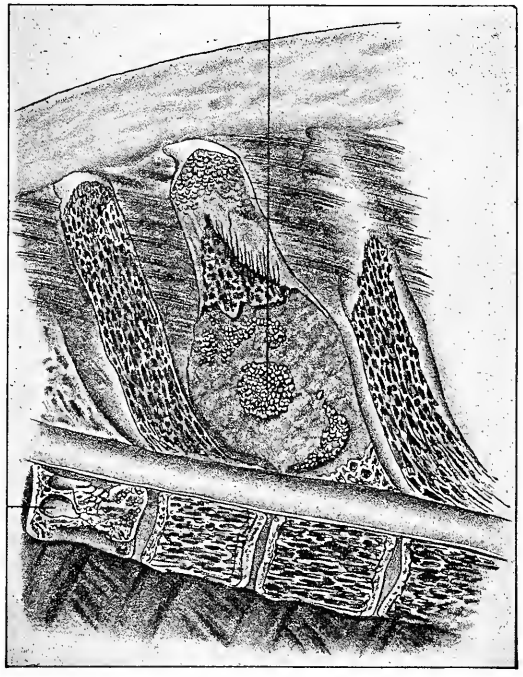


Fig. 103.—Vertebral tuberculosis in the hog.

come infiltrated with blood are unfit for food; the other parts of the carcass are not affected. In the healing of bone fractures large thickenings may arise, which are of no consequence in meat inspection (Fig. 101).

Swelling of the bone may appear as a result of tuberculosis, the bones becoming enlarged and so soft on the surface that they may be

cut with a knife. On the surface of a section soft masses of tissue are observed containing small caseous foci (Figs. 102 and 103).

Actinomycosis of the bones is particularly frequent in the upper and lower jawbones of cattle. These bones are greatly enlarged (Fig. 104) and often permeated with fungoid tumorous masses, which possess a red color and small punctiform yellow pits.

Lime deposits are observed in the cushion beneath the sternum. Calcareous deposits are distinguished from tuberculous alterations

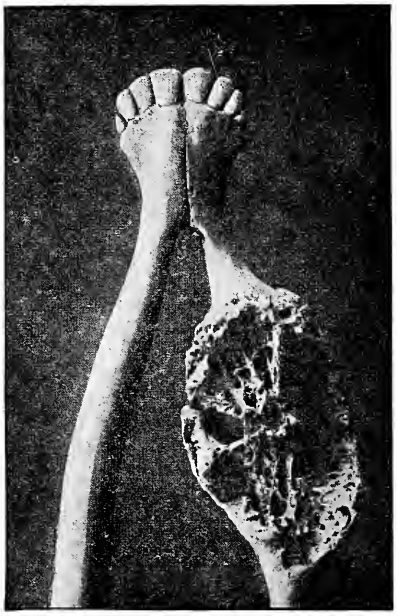


Fig. 104.—Lower jaw of beef with swelling following actinomycosis.

by their pure white color, and by the fact that the alterations do not proceed from the center of the sternum as in tuberculosis, but develop underneath the sternum (Fig. 105). The calcified part is to be removed.

10. The Musculature

Both slight and extensive ruptures may be found in the muscles. Small ruptures are frequently found in the diaphragm of fat healthy

swine, and also in the abdominal and pelvic musculature. Such ruptures are characterized by the appearance of numerous small hemorrhages in the muscles (Fig. 106). This condition is distinguished from that of septicemia by the absence of hemorrhages in the viscera. Moreover, whole muscles may be torn in two, producing extensive hemorrhages. In either case the hemorrhages are of mechanical origin and do not lead to condemnation of the affected parts unless the muscles are extensively infiltrated with blood.

Discolorations of various sorts may also occur in the musculature. The muscles may become like fish meat or waxy. These may be

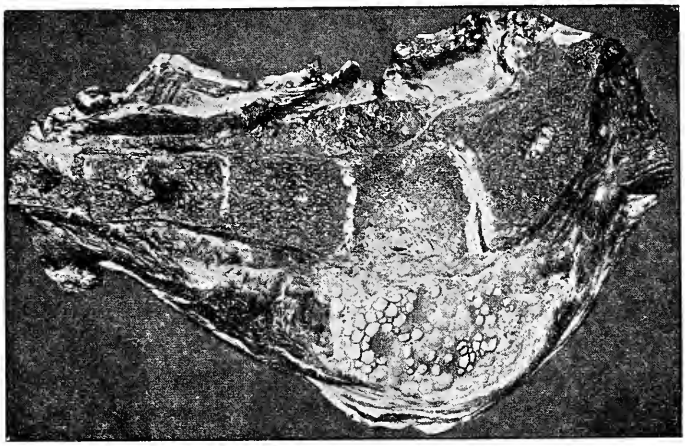


Fig. 105.—Lime deposition below the sternum of beef.

symptoms of serious disease. Occasionally the meat of large food animals assumes the color and other characteristics of chicken meat. Now and then a white or gray discoloration is seen in the longissimus dorsi in swine as a result of deficiency in muscle pigment. This defect does not appear until the carcass is cut up for the trade.

Simple tumors may appear in the musculature. The alterations of actinomycosis and tuberculosis are also observed. In actinomycosis the connective tissue increases at the expense of muscle tissue until the structure becomes tough and almost like wood (see wooden tongue). In cases of muscle tuberculosis tubercles arranged like

strings of pearls are formed at the expense of the muscle tissue. Large tuberculous tumors may also be found in the musculature.

The musculature may also be the seat of Miescher's sacs, cysticerci and trichina.

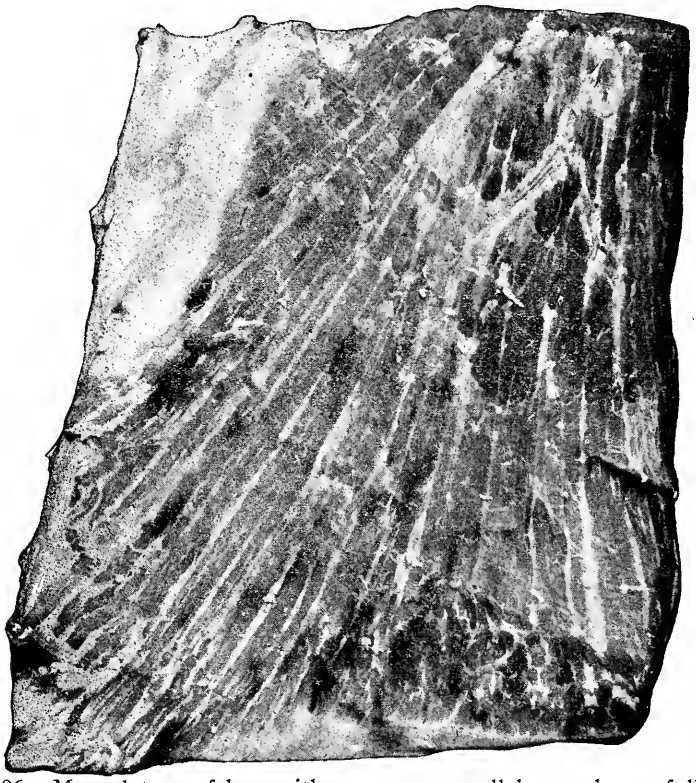


Fig. 106.—Musculature of hog with numerous small hemorrhages following rupture. The black spots indicate the hemorrhages.

II.—BLOOD DISEASES

Blood diseases are classified as anemia, hydremia or dropsy, icterus, uremia and leukemia.

1. Anemia

In anemia the quantity of the blood is diminished. The animals are chlorotic, have pale mucous membranes, and in acute cases show

malnutrition. The blood has a weaker coloring power than in healthy animals. Anemia is especially frequent in sheep, and in general occurs more often in young than in old animals. The common predisposing causes of anemia are animal parasites in the stomach, intestines, lungs and liver, and chronic gastric and intestinal catarrh. If an anemic carcass shows a fairly good nutritive condition it is passed. Acute cases of anemia and emaciation are condemned.

2. Hydremia or Dropsy

Hydremia consists in an increase of the water content of the blood. It develops from anemia. Sheep, goats and young cattle are more susceptible than old cattle and hogs. The hydremic condition is followed by dropsy.

In the live animal one notes painless, doughy, pitting, nonfeverish swellings on the lower parts of the body (head, neck, breast, belly, udder, legs). In advanced cases there may be weakness, loss of appetite and emaciation.

In the carcass the following conditions are to be noted: thin, serumlike, faintly colored blood; a collection of clear, colorless and odorless fluid in the abdominal and thoracic cavities, of which the serous membranes are smooth, shiny and not inflamed. The connective tissue of the subcutis and muscles shows a watery infiltration of a gelatinous character. The muscles are soft, grayish red, and decompose rapidly. If the serous infiltration of the muscles is extensive, the carcass is condemned.

3. Icterus

Icterus consists in a yellow coloration of the tissues by the bilirubin of the bile, which is absorbed in the blood as a result of obstruction of the bile ducts. Icterus is frequently not detected in ante-mortem inspection, for the reason that the general condition of the animal is seldom affected.

In the carcass icterus is to be recognized by the yellow or yellowish green coloration of the pleura, peritoneum, liver and kidneys. In more advanced cases the connective and adipose tissues are affected, and in acute cases even the bones and cartilages. In mild

cases the yellow color disappears within twenty-four hours. Such carcasses are passed, but if the yellow or greenish yellow discoloration persists after cooling, the carcass is condemned.

4. Uremia

Uremia arises from the accumulation of urine in the blood when the urine cannot be excreted (as in bilateral renal inflammation), or when the bladder is ruptured or the urethra is injured so that the urine is poured into the body cavity or into the subcutis, and again absorbed into the blood. Uremic animals show symptoms of serious disease. The expired air may smell urinous. The odor may disappear on cooling but reappears on cooking. Carcasses exhibiting urinous odor are condemned.

3. Leukemia

By the term leukemia is understood an increase in the number of leucocytes to such an extent that the blood no longer has its normal red color, but is light red or even puriform. In leukemia swelling of the spleen and of all the lymph glands occurs. A suspicion of leukemia may be entertained even in the live animal from the swelling of the lymph glands, e.g., the prescapular glands. In leukemia the beef spleen may attain a weight of 20 kg. and the hog spleen 3 kg. The swelling of the spleen in leukemia is distinguished from that in anthrax by the fact that the swollen spleen in leukemia possesses a firm consistency. Leukemic carcasses are condemned.

III.—INTOXICATIONS AND AUTOINTOXICATIONS

Poisoning of food animals may arise from the ingestion of poisonous plants, accidental ingestion of poisonous substances and from careless administration of drugs. The general condition of the animal is greatly disturbed in cases of poisoning. The disposition to be made of the carcass depends upon the nature of the poison.

Milk fever or parturient paresis is a disease of unknown origin, which occurs soon after parturition. Affected cows are unable to stand or to swallow. The disease attacks chiefly well-nourished cows within three days after parturition. No characteristic lesions are

found in the viscera. The regulation requiring the condemnation of all animals which have given birth within ten days before slaughter covers cases of milk fever.

IV.—ANIMAL PARASITES AND THE DISEASES BY THEM

A large number of animal parasites occur on the body or in the viscera of food animals. As a rule they produce no striking pathological symptoms in the living animal, being in the majority of cases unexpectedly found in inspection.

Animal parasites may be classified in two groups: those which are not transmissible to man in eating the meat, and those which are transmissible to man in the affected meat.

The vast majority of animal parasites are found in the first group, for only four animal parasites are transmissible to man in meat, viz., beef measle worm (*Cysticercus inermis*), the measle worm of the hog, sheep and goat (*C. cellulosæ*), trichina and the echinococcus tapeworm. Carcasses affected with tapeworm cysts are condemned or rendered into lard or tallow. No inspection is made for trichina.

The most important animal parasites of which man is not a host:

Parasites of the Skin

The skin may be infected with mange bites and follicular mites, the former causing scabies. Sheep scab and cattle mange are the most important diseases of this class.

Sheep scab is caused by mites which live between the epidermal scales, sucking blood and lymph, and thereby causing the appearance of the characteristic scabs of the disease. Affected sheep show symptoms of itching. The fleece is uneven and with hanging tufts of wool. Later, large irregular areas appear on the back and are covered with short, rubbed-off wool and scales (Fig. 107). Grayish white crumby scales and scabs, as well as reddish yellow thickenings, superficial suppuration and folds in the skin, are found on the affected areas. Carcasses of animals in advanced stages of the disease are condemned.

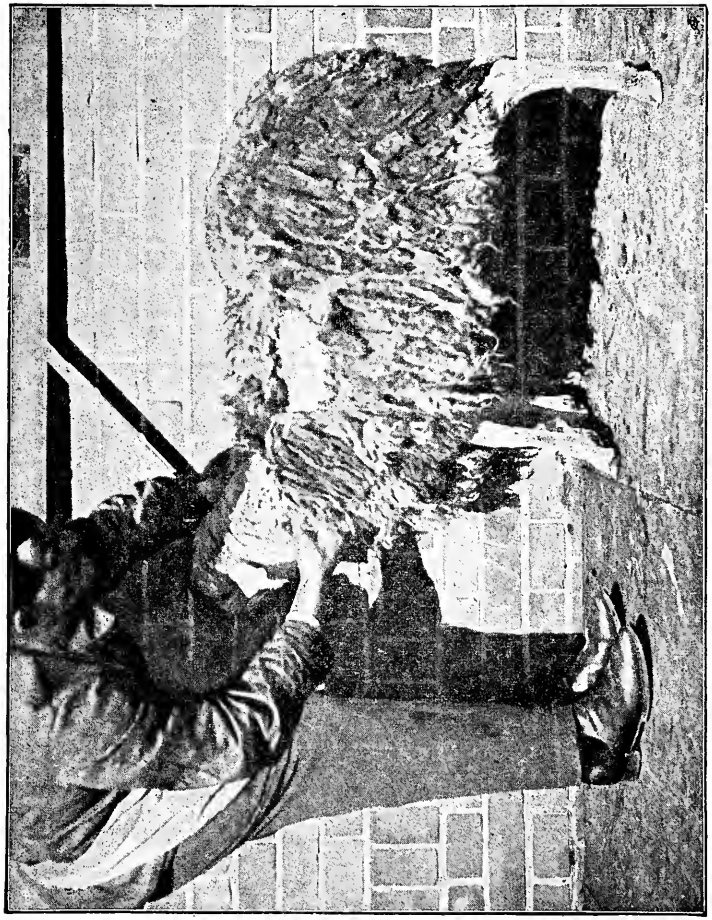


Fig. 107.—Scabby sheep with matted wool and bare spots.

Mange of cattle is caused by a closely related mite and is characterized by symptoms very similar to those of sheep scab.

The hair follicle mite may infest the skin of hogs, producing grayish yellow tubercles. The chief locations for these tubercles are the snout, neck, lower part of the breast, belly, flanks and inside of the thighs.

In the skin of pastured cattle warble fly larvæ are found. They are white, yellow or greenish brown, 1 to 2 cm. long, and lie in connective tissue capsules which are filled with pus (Fig. 109). A watery fluid without bad odor accumulates about the warbles. The earlier stages of the larvæ are passed in the wall of the esophagus (Fig. 110) and in the spinal cord.

Parasites of the Nasal Passages

Sheep bot flies live parasitic in the nasal cavities and frontal sinuses of sheep. They resemble the larvæ of warble flies.

Muscle Parasites

Miescher's sacs are found in the musculature, most frequently in hogs and sheep, less often in cattle and goats. Only exceptionally are these parasites visible to the naked eye. This is most frequently the case in sheep, in which the sacs may be 1.5 cm. long and 3 mm. broad. Even the smallest specimens become visible to the naked eye after calcification, appearing as white points or streaks (calcareous deposits or concretions, Fig. 108). These calcareous concretions may be confused with calcified measle worms and trichinæ. The chief locations for Miescher's sacs are the abdominal muscles and muscular portion of the diaphragm in hogs, and the abdominal and skin muscles in sheep.

A large form of Miescher's sacs is found quite frequently in the esophageal musculature of sheep and goats in the form of oblong sacs, sometimes attaining the size of hazel nuts (Fig. 111). The color is white, and the contents puslike. These sacs may occur to the number of several dozen in the esophagus. If Miescher's sacs are present in such numbers that the musculature is discolored or infiltrated, the meat is unfit for food.

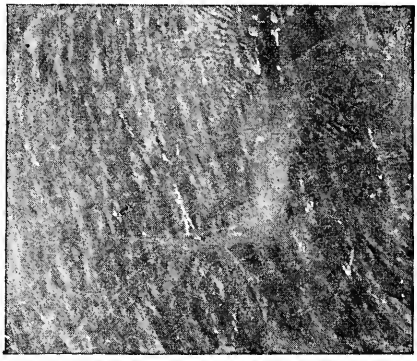


Fig. 108.—Lime concretions in the musculature of the hog.

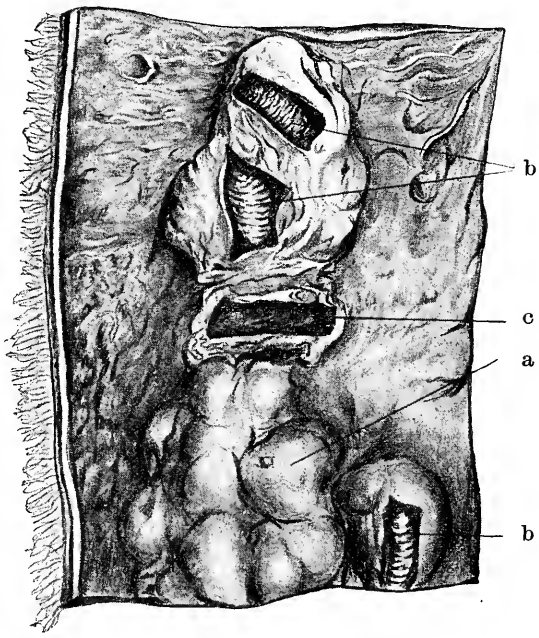


Fig. 109.—Beef subcutis with warble fly larvæ.
a- closed swelling, *b*- swellings opened showing larvæ, *c*- empty swelling.

Visceral Parasites

Round worms and tape worms occur in the stomach and intestines of cattle, sheep, goats and hogs. Round worms and echinococci are also found in the lungs, and fluke worms, *Cysticercus tenuicollis,* echinococci and pentastomes in the liver. Pentastomes occur also in the lymph glands, especially in the mesenteric glands; echinococci in the spleen, heart, kidneys and, exceptionally, in the mus-

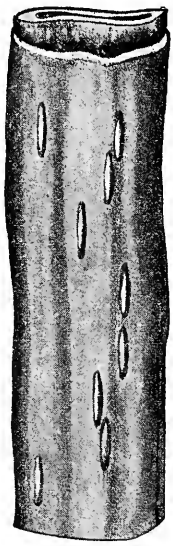


Fig. 110.—Beef esophagus with young larvæ of warble fly.

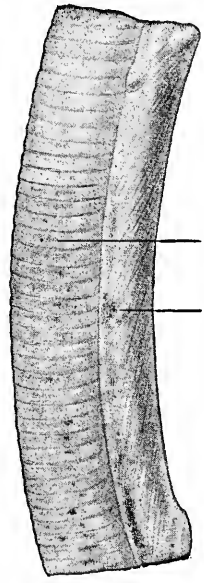


Fig. 111.—Miescher's sacs in the musculature of the sheep esophagus.

cles; and flukes occasionally wander into the lungs, spleen and elsewhere. The gid worm is found in the brain.

The essential features of these parasites are discussed in the following paragraphs.

1. Cysticercus Tenuicollis

C. tenuicollis is the asexual stage of *Tænia marginata* of the dog. It is found chiefly in sheep and hogs, less often in calves and adult cattle. This bladder worm occurs in the form of round or oval vesi-

cles varying in size from that of peas to that of walnuts or apples (Fig. 112). The bladders are transparent and filled with a clear watery fluid. The scolex of the parasite may be seen through the wall of the bladder as a white, spherical structure. The preferred

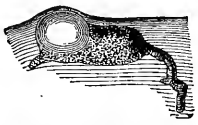


Fig. 112.—*Cysticercus tenuicollis* and burrow in hog liver.

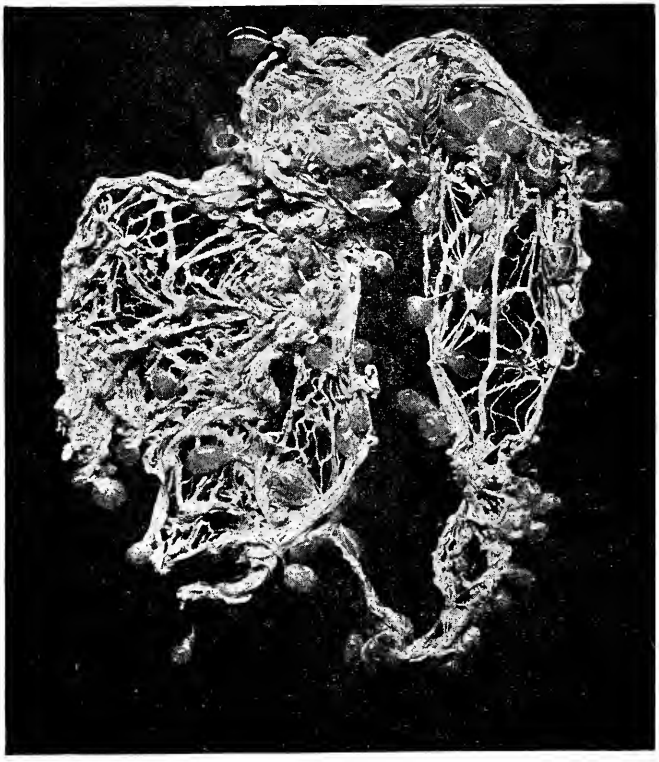


Fig. 113.—Omentum of hog with *Cysticercus tenuicollis.*

locations of the cysticercus are the omentum (Fig. 113), mesentery, peritoneum, pleura and liver. In wandering about under the peritoneum and in the liver the parasite makes irregular burrows (Fig.

112), which are at first dark red, later brownish or greenish. *C. tenuicollis* is distinguished from the measle worms of pork and beef by the fact that, unlike the two latter parasites, it occurs only in the viscera and not in the muscles.

2. The Brain Bladder Worm

The brain bladder worm or gid worm is the larval stage of *Tænia cœnurus* of the dog. It occurs chiefly in the brain, less often in the spinal cord, of sheep, goats and cattle, causing gid. The gid worm occurs in the form of round or oblong vesicles varying in size from a millet seed to a hen's egg, sometimes crowding the brain tissue aside. The vesicles are filled with a watery fluid (Fig. 100). White, punctiform structures, the scoleces, are to be seen on the inner surface. Only a few cases of this disease have been observed in the United States.

3. Liver Flukes

Liver flukes live in the bile ducts, but occasionally wander into the lungs, spleen and other parts. These parasites are very common in cattle and sheep, less frequent in hogs and goats. Flukes are exposed to view by opening the bile ducts. There are two species of fluke worms, which are found in meat inspection.

The common liver fluke (*Fasciola hepatica*) is a leaf-shaped worm, 1½ to 4 cm. long and ½ to 1 cm. broad. It produces inflammation of the bile ducts, which are finally transformed into thickened stiff tubes as a result of calcification. The thickened bile ducts are particularly prominent on the gastric surface of the liver (Fig. 114). By extension of the inflammation from the bile ducts the liver tissue may undergo induration.

The large American fluke (*F. magna*) is found in the liver or lungs of cattle. The body is flesh-colored, 20 to 100 mm. long and 11 to 16 mm. wide. It is perhaps more frequently met with in cattle than the common liver fluke.

In Germany the lancet fluke (*Dicrocœlium lanceolatum*) infests cattle, sheep and swine. It is lance-shaped, 4 to 8 mm. long and

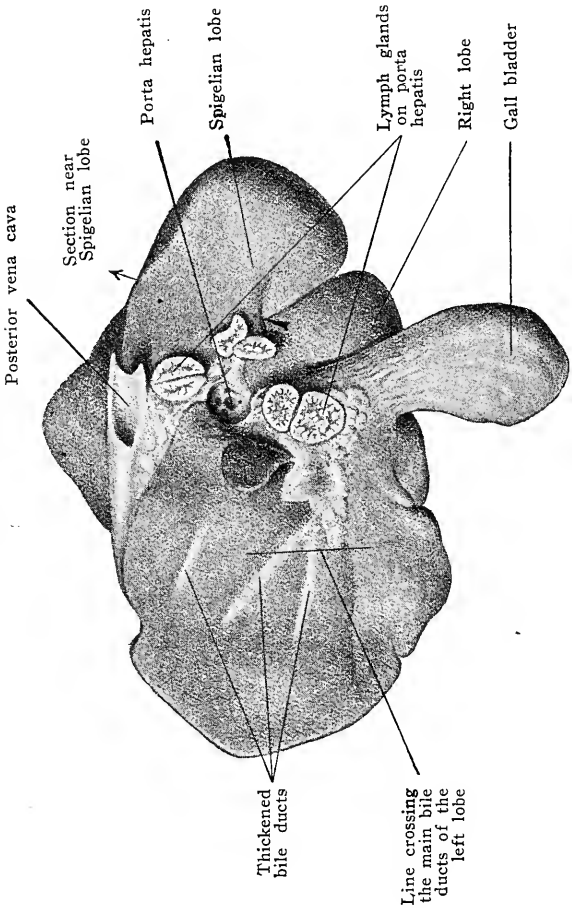


Fig. 114.—Gastric surface of beef liver with bile ducts thickened as a result of infestation with flukes.

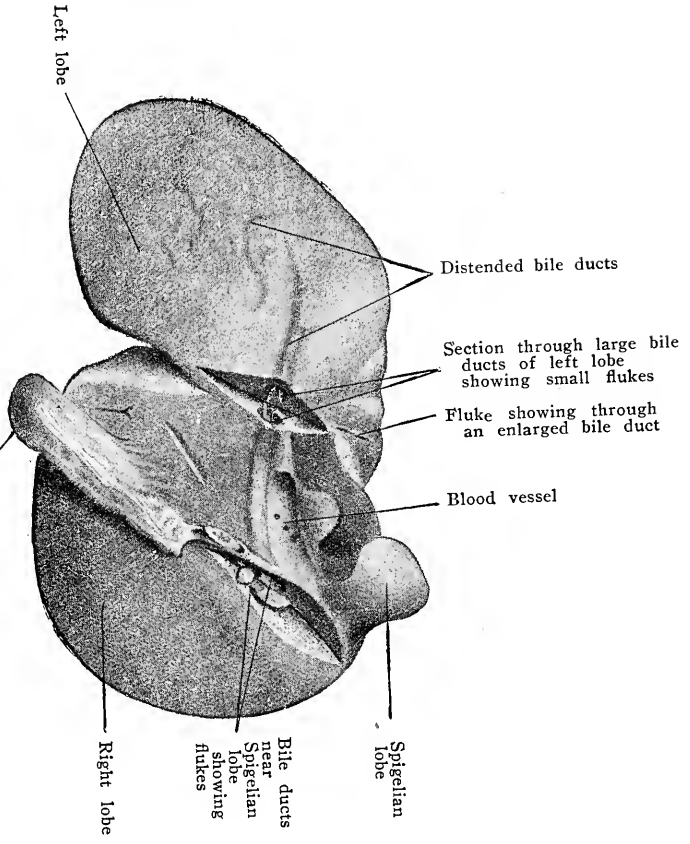


Fig. 115.—Gastric surface of sheep liver with enlarged bile ducts following infestation with liver flukes. Some of the flukes appear in the cuts.

1 to 2½ wide. As a rule it produces merely enlargements of the bile ducts. It may be seen through the distended bile duct (Figs. 115 and 116).

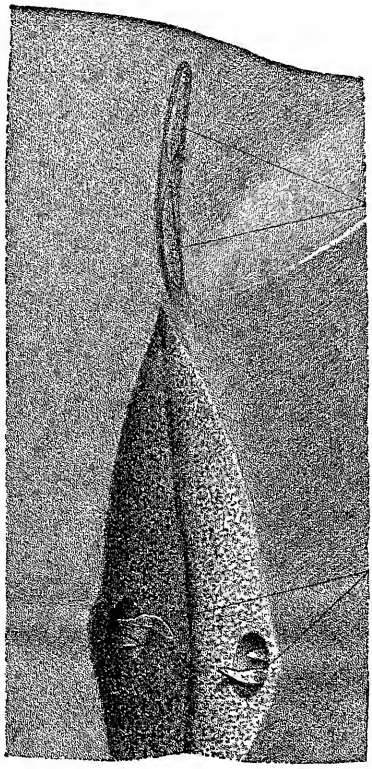


Fig. 116.—Enlarged section of bile duct of left lobe of sheep liver.

4. Echinococci or Hydatids

Echinococcus is the immature stage of *Tænia echinococcus* of dogs. It appears under two forms.

Echinococcus polymorphus occurs in cattle, sheep and goats. The worm is a roundish hydatid varying in size from a pea to a child's head, and filled with a clear fluid or small vesicles (daughter cysts). The wall of the mother cyst is a grayish white, opaque membrane. This in turn is surrounded by a connective tissue cap-

sule firmly united with the adjacent tissue. On the inner surface of the hydatid membrane are found the white punctiform scoleces. Echinococcus occurs in the liver (Fig. 117), lungs, heart, spleen, kidneys and less often in the musculature. Hydatids in the heart (Fig. 118) may cause sudden death. Dead echinococci become transformed into yellow, caseous or calcareous masses surrounded by a connective tissue capsule.

Echinococcus multilocularis is found almost exclusively in cattle. It occurs chiefly as a nodular tumor in the liver, varying in firmness,

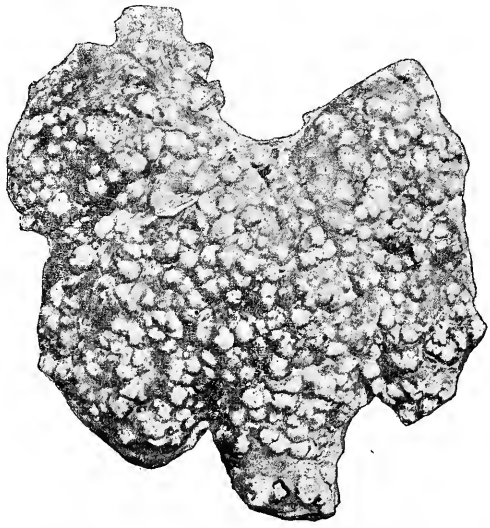
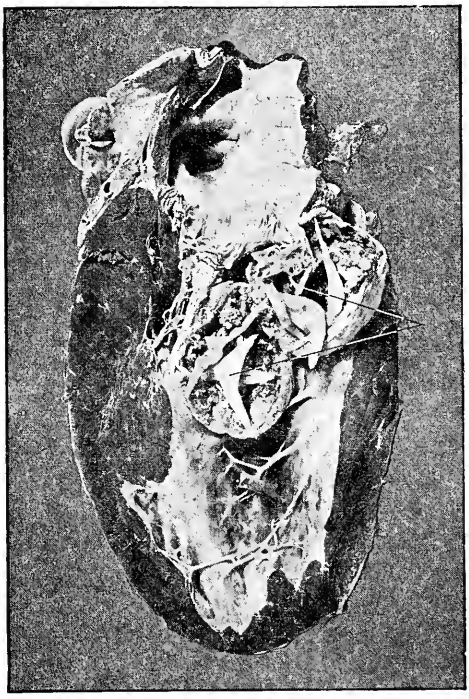


Fig. 117.—Hog liver with numerous *Echinococcus polymorphus.*

and ranging in size from a hazel nut to a fist. The outer part of these tumors consists of numerous closely packed transparent vesicles ranging in size from a mustard seed to a pea. The central part of the tumor is composed of gelatinous, membranous, caseous or calcareous masses. The whole tumor is divided into numerous chambers by a strongly developed connective tissue framework (Figs. 119 and 120).

Dead hydatids might be mistaken for tuberculous foci, but are to be distinguished by the absence of involvement of the corresponding lymph glands.



The two halves of an echinococcus

Fig. 118.—*Echinococcus polymorphus* in the heart.

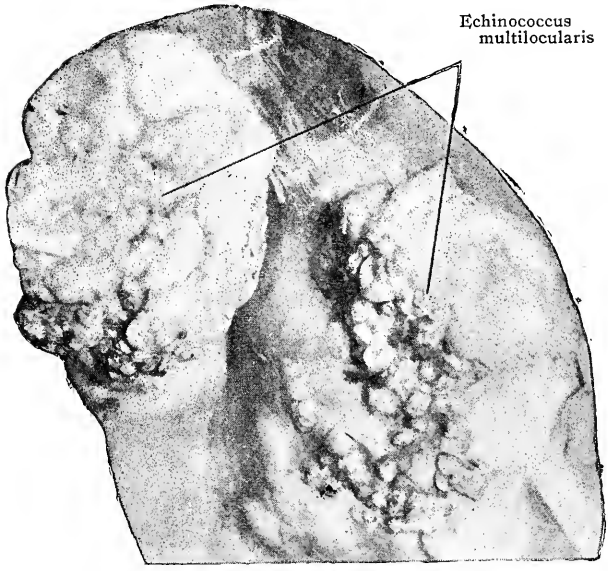


Fig. 119.—Portion of beef liver with *Echinococcus multilocularis.*

Fig. 120.—Portion of beef liver showing cross section of *Echinococcus multilocularis.*

5. Lung Worms

In the lungs of cattle and more frequently in sheep, goats and hogs we find round worms which live parasitic in the bronchi, causing inflammation of the air passages and even of the lung tissue.

A pure white, threadlike round worm, 3 to 8 cm. long, occurs in the lungs of cattle, especially in the bronchi at the base of the lungs. The parasites are exposed to view by incising the lung

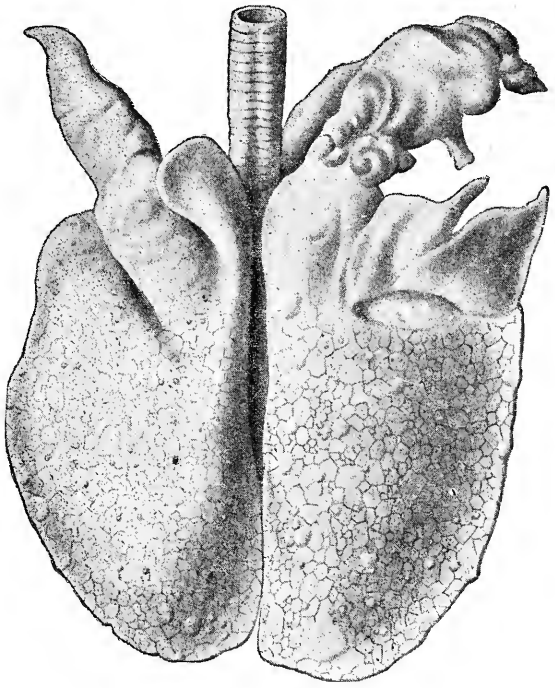


Fig. 121.—Sheep lungs with nodules and pseudotuberculous tubercles produced by lung worms.

through the lower third. The lung worms are found imbedded in slime, or dead specimens are found in small greenish tubercles in the lungs.

A similar round worm is observed in the lungs of sheep. It is 2½ to 8½ cm. long, and is found in the bronchi. The hair worm, ½ cm. long, and about the thickness of a hair, also occurs in the

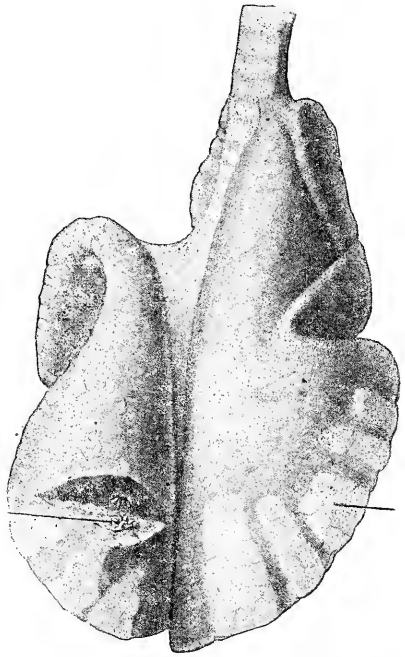


Fig. 122.—Lung of hog with lung worms.

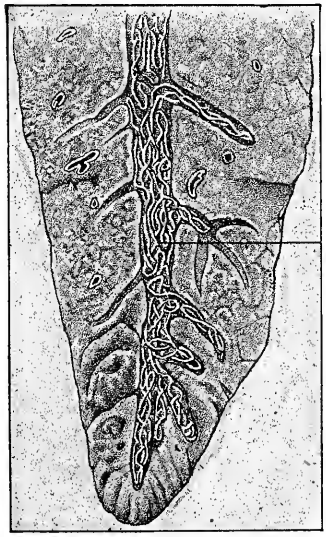


Fig. 123.—Bronchial tube of hog with lung worms.

lungs of sheep. This worm may produce large, gray and grayish red nodules (inflammatory foci), and small, miliary tubercles in the lung tissue, which are yellow and cloudy in the center as in tuberculosis (Fig. 121).

In lung worm infestation the pulmonary lymph glands are normal, and this fact at once distinguishes the disease from tuberculosis.

A white filiform round worm is often found in the lungs of hogs. This worm causes no pulmonary inflammation. It is commonly found only at the base of the lungs. Its presence may lead to the formation of pearly spots on the border of the lungs (Fig. 122).

6. Pentastomes

Pentastomes occur in food animals in two forms: as larvæ or immature, and as mature parasites. The larvæ are about ½ cm. long, flat, white but transparent, and slightly more than 1 mm. wide. They are found in the lymph glands, particularly the mesenteric glands of sheep and cattle, and produce in them yellowish, green or gray foci ranging in size from a millet seed to a pea. The larvæ may also occur under the peritoneum and in the liver and lungs. The sexually mature parasites live in the nasal cavities and frontal sinuses of dogs and goats. They are 8 to 20 mm. long, tapering gradually posteriorly (Fig. 82).

Organs or parts infested with animal parasites not transmissible to man are removed and condemned. The rest of the carcass is passed.

Animal Parasites which are Transmissible to Man

Four animal parasites of food animals are transmissible to man: beef measle worm, pork measle worm, trichina and *Tænia echinococcus*.

1. Beef Measle Worm

The beef measle worm is the immature stage of *Tænia saginata* of man. It has no circle of hooks, and is therefore called *Cysticercus*

inermis (*C. bovis*). The beef measle worm occurs in the form of spherical or oblong vesicles (Fig. 124) in the skeletal, cardiac and lingual musculature, and exceptionally in certain viscera (lungs, liver, brain and lymph glands). The vesicles are gray, transparent, and consist of an outer connective tissue sac and the parasite itself. The latter is in turn a delicate vesicle containing cloudy scoleces

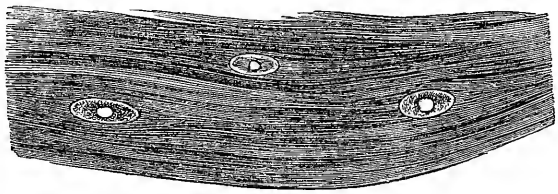


Fig. 124.—Beef measle worms with head showing in natural position in the musculature.

as large as millet or hemp seed (Fig. 125). The size of the measle worm varies, according to the stage of development, from that of a pinhead to a pea. Exceptionally the cysticercus is not transparent, but grayish white and surrounded with a tough capsule. After the cysticerci have died the contents of the sac may be caseous or calcified instead of liquid. Dead cysticerci are characterized by the green

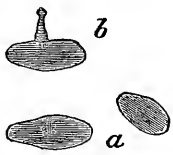


Fig. 125.—Beef measle worms removed from their cysts. *a*- with head showing through, *b*- with protruded head.

color of the vesicle contents. The beef measle worm is relatively frequent, affecting .1 to .4 per cent. of cattle in different regions, and appearing oftener in steers than in cows.

Favorite locations. In the vast majority of cases only a few measle worms are found, chiefly in the masticatory muscles and heart. The masseter and pterygoid muscles are infested with equal frequency. Beef measle worms may also be found in the tongue, neck

muscles, muscular portion and pillars of the diaphragm, intercostal and breast muscles. Moreover, in cutting up measly cattle, cysticerci may be discovered in the muscles of the shoulder and inner part of the thigh. The viscera, with the exception of the heart, are seldom infested. Only in extensive infestation are the lungs, liver, brain and lymph glands attacked. Exceptionally, however, in cases of very slight infestation cysticerci may be found in the lungs, liver, lymph glands, brain and esophagus.

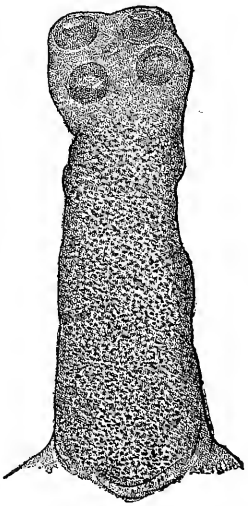


Fig. 126.—Scolex of beef measle worm protruded and enlarged, with 4 sucking discs and circle of hooks.

In inspection for cysticerci the pterygoid and masseter muscles and the heart are incised. This is not necessary with calves under six weeks of age, for they do not harbor viable, but only immature or undeveloped cysticerci. For the rest, cysticerci are recognizable from their form, position and possession of both capsule and vesicle. Identification is difficult only in cases of very small, undeveloped, dead, casefied or calcified cysticerci.

Cysticercus tenuicollis is distinguished from the beef measle worm by the fact that the former is never found in the striated musculature, but only under the serous membranes and, in young animals,

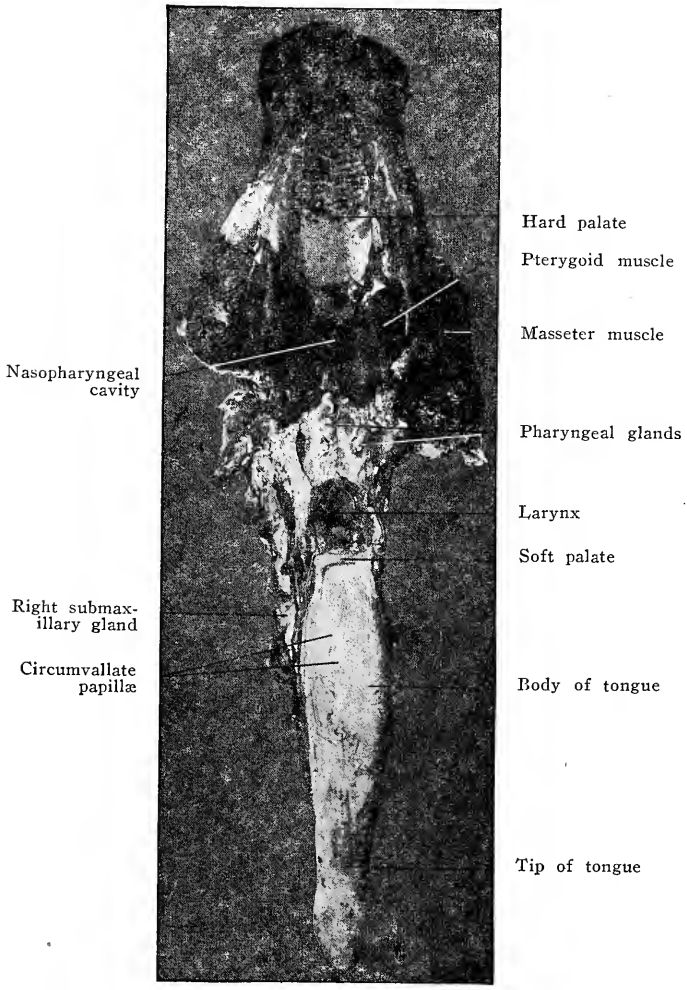


Fig. 127.—Beef head and tongue.

in the liver. Furthermore, *C. tenuicollis* is ordinarily much larger than *C. bovis*.

Hydatids are only occasionally found in the musculature, but occur chiefly in the viscera and are further distinguished from measle worms by their rounder form and the absence of any structure corresponding in size and form to the cysticercal scolex.

Vesicles of the size of peas, filled with a clear, watery fluid but not containing parasites, are found on the cardiac valves of cattle, hogs and sheep.

The beef measle worm may be killed by cooking or pickling the meat, or by preservation in cold storage for three weeks, but measly parts or carcasses are condemned.

2. The Cysticercus of Hogs, Sheep, Goats and Dogs, or the Pork Measle Worm

The pork measle worm is the immature stage of *Tænia solium* of man, and is known as *Cysticercus cellulosæ*. The hooks are visible through a hand lens but not to the naked eye (Figs. 131 and 132). The pork measle worm closely resembles the beef measle worm in form, but its capsule is more delicate and, therefore, more transparent. The scolex is hence more easily seen through the cyst than is that of the beef measle worm. As in the latter, the size varies with the age and development of the parasite.

Caseation and calcification take place less often than in the beef measle worm. In addition to swine, *C. cellulosæ* occurs exceptionally in sheep, goats and dogs. It is relatively rare even in hogs, occurring in the hogs of some localities in only .03 per cent. of cases.

The favorite locations for *C. cellulosæ*, which are always to be inspected for the worm, are the adductor muscles of the thigh, abdominal muscles, muscular portion of the diaphragm, and intercostal, lumbar, cervical, sternal, cardiac, lingual, laryngeal and masticatory muscles (Fig. 133). All these muscles are examined and the heart is incised in inspection. Other viscera may be infested, notably the brain, lymph glands and the subcutaneous fat tissue. These parts should also be examined. Other viscera are only exceptionally in-

Fig. 128.—Musculature of hog with measle worms appearing on the cut surface.

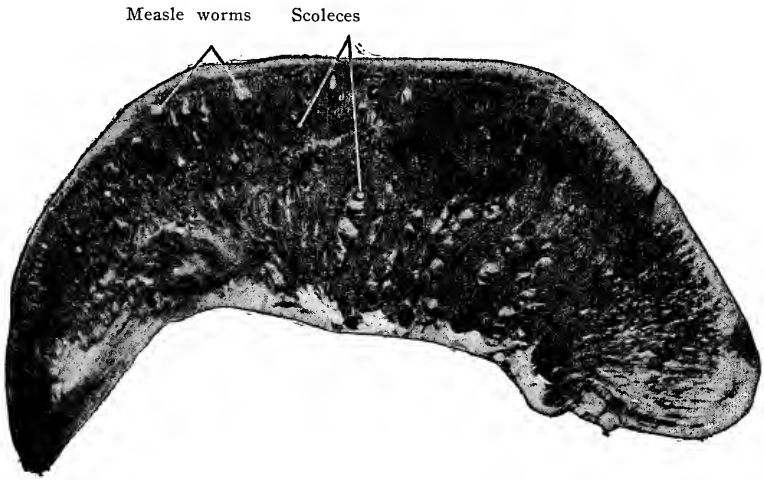


Fig. 129.—Section through a measly hog tongue.

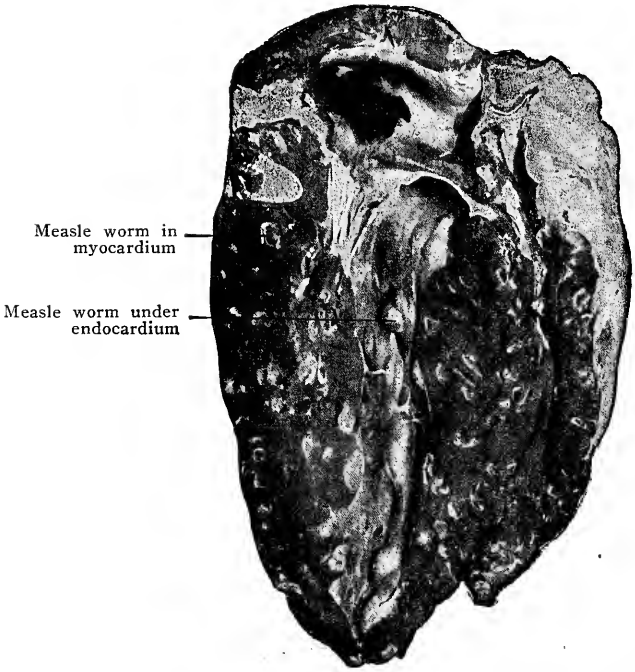


Fig. 130.—Section through a measly hog heart.

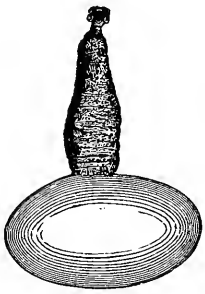


Fig. 131.—Pork measle worm with protruded scolex, slightly enlarged.

fested, but in such cases of general infestation the lungs, liver, spleen and eyes are sometimes attacked.

Hogs show an extensive infestation with measle worms much more frequently than cattle. Sometimes the musculature is discolored grayish red and strongly infiltrated.

The criteria mentioned in reaching a differentiation between beef measle worms and *C. tenuicollis* and other structures apply also to the pork measle worm.

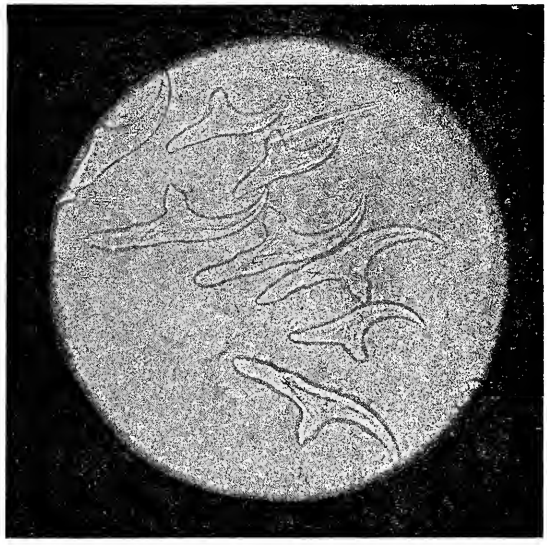


Fig. 132.—Single hooks of a dangerous measle worm, greatly enlarged.

C. cellulosæ may be killed by cooking or pickling the meat, but not by preservation in cold storage. Infested parts and carcasses are condemned.

3. Trichina

At present no inspection is made for trichina. The reasons for the abandonment of trichina inspection cannot be better stated than in the words of Dr. Melvin from the Twenty-third Report of the Bureau of Animal Industry:

"While the Federal meat inspection in this country is as thorough as a comprehensive law, stringent regulations, and a liberal appropriation of money can make it, and the consumer of meats bearing the stamp 'U. S. Inspected and Passed' may in general have the comfortable assurance that he is buying and eating products from healthy animals prepared under clean and sanitary conditions and the danger of contracting disease from eating these meats is practically eliminated, yet the fact should not be overlooked that there is one disease against which the meat inspection legend does not pretend to be a safeguard. For the detection of most of the diseases affecting meat the human eye needs no assistance. The disease called trichinosis, however, to which hogs are subject, is caused by a parasite so small that the microscope must be employed to detect it. Thorough curing or thorough cooking of the meat kills this parasite. It seems, however, that some European peoples have a habit of eating raw or half-raw pork, and consequently they have suffered from this disease. Very elaborate measures have been taken in some countries to do away with or to lessen the danger. In Germany, for instance, there is an army of inspectors who use the microscope to detect these parasites in pork. These countries some years ago forbade the importation of American pork products unless they had been microscopically inspected. To meet this requirement the Bureau instituted several years ago a system of microscopic inspection of pork intended for shipment to such countries. No microscopic inspection of pork intended for home consumption, however, has ever been made or even contemplated. The Department takes the ground that from the nature of the disease an examination of certain parts of a hog carcass can only minimize and not eliminate the danger.

"The parasites, it is true, are usually found, if found at all, in certain parts, as the pillar of the diaphragm, the psoas muscle, the inner aspect of the shoulder, or the base of the tongue. Not finding them in these parts by the usual methods, it may be assumed to be probable that they do not exist in the remainder of the carcass. This is, however, only a probability, as they may exist, and even to such an extent as to produce disease if the flesh is eaten raw. Many cases are on record where twenty, even thirty, examinations were made before trichinæ were found; and out of 6,329 cases of trichinosis in Germany, between 1881 and 1898, a careful inquiry traced 2,042 cases (over 32 per cent) to meat which had been microscopically examined and passed as free from trichinæ. In view of these facts the Department has regarded it as utterly impracticable to inspect hog carcasses for this disease. It has further taken the view that such inspection—which as formerly carried on for exported products would cost about $3,700,000 a year if all hogs killed at inspected houses were so examined—would do more harm than good. It would create in the minds of the consumers a feeling of false security, which might lead them to omit the only sure means of escaping danger, namely, to refrain from eating uncooked or uncured pork; and it would thus defeat its very purpose and render the great trouble and expense worse than useless.

"Not only has the Department not inspected for trichinæ the pork consumed at home, but it has abandoned recently such inspection of pork products going abroad. It was found that even after our elaborate examination some foreign countries, although requiring our inspection, paid no attention to our certificates, and conducted an examination of their own, on the result of which depended the admission of the products. On the ground, then, that our examination was superfluous, the Department stopped it. Of the principal countries formerly requiring certificates of this examination Italy and France already have agreed to admit our products without them, and upon the certificate simply of the regular inspection under the present law. It is hoped that other countries will take similar action."

A trichina inspection is maintained in Germany, and the following summary of Ostertag's descriptive matter on the biology and economic importance of trichina may be of interest.

The trichina is a round worm, which occurs in the form of muscle trichinæ and intestinal trichinæ, the former being undeveloped worms and the latter developed or sexually mature worms.

If a man or animal eats meat containing muscle trichinæ, they develop in the intestines within 36 to 48 hours into intestinal trichinæ (male and female worms). The females produce thousands of living young, which penetrate into the intestinal lymph vessels, pass through the lymph glands, and reach the blood system through the thoracic duct. By means of the blood they are carried to the muscles, where they continue their development. They wander through the muscles until an obstruction is reached at the union between muscle and tendon. Here the trichinæ come to rest and grow to the size of 1 mm. They then coil up spirally and become surrounded with a capsule. The capsules attain their complete development within three months after the ingestion of the trichinous meat. The capsules are at first transparent, but later calcify and become opaque.

A microscope is required for the detection of trichinæ. It is only in case of strong development of fat tissue at both ends of the capsule, and in the presence of strong calcification, that trichinæ are visible to the naked eye as calcareous concretions.

In Germany the inspector takes samples of meat from the favorite locations of trichinæ, 24 samples from each whole carcass and 18 from each separate piece of pork presented for inspection. The microscope should be capable of giving a magnification of 30, 40,

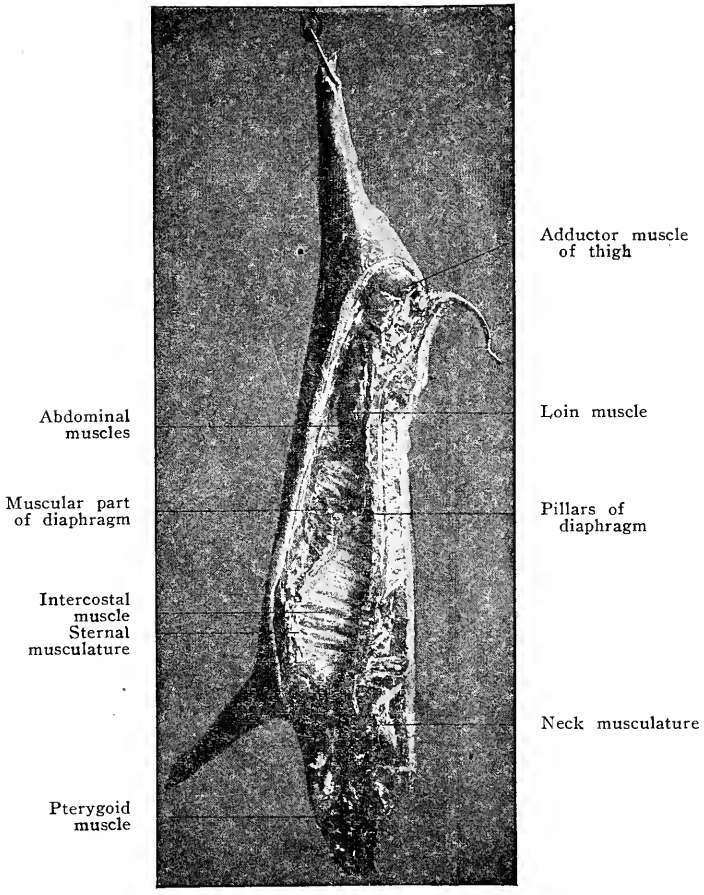


Fig. 133.—Favorite locations of hog measle worms.

and 100 diameters. Special instruments, boxes for samples and a compressorium have been devised for this work. The German meat inspection law requires that the inspector spend at least eighteen minutes in the examination of the samples from each hog carcass. The samples are taken from the favorite locations of trichinæ, viz., pillars of the diaphragm, costal portion of the diaphragm, laryngeal muscles and lingual muscles (Fig. 133).

Trichinæ occur in wild and domestic hogs, dogs and other animals. Hogs and dogs become infested by eating trichinous rats, which harbor large numbers of trichinæ, especially about country slaughter houses. The extent of infestation of hogs ranges from .007 to .008 per cent. in different localities.

4. Tænia Echinococcus

T. echinococcus is the sexually mature developmental form of hydatids and lives in the small intestine of dogs. It is a very small tapeworm, not more than 3 or 4 mm. long and 1 mm. wide. In this country dogs are not considered as human food, but man may acquire the hydatid disease by too close association with dogs in unsanitary surroundings.

V.—INFECTIOUS DISEASES

Infectious, contagious or communicable diseases are due to bacteria which gain entrance to the animal body in the food, in the inspired air or through wounds. Some species of pathogenic bacteria multiply only at the point of inoculation. Others gain entrance to the blood and thus reach all parts of the body. In the latter case the raw meat may be virulent. A number of infectious diseases are readily transmitted from one animal to another, and may thus appear as plagues of wide extent. In some infectious diseases, however, the virus produces infection only when introduced into wounds (tetanus, septicemia).

1.—Tuberculosis

Tuberculosis is a chronic, infectious disease of great frequency in cattle and hogs, occurring less often in calves, goats and sheep. The percentage of animals affected with tuberculosis varies greatly in different localities and in different species. Of 4,841,166 cattle slaughtered under Federal inspection in 1900, 5,279 were sufficiently affected to cause condemnation of part or all of the carcass. This number amounts to .1 per cent. Of 23,336,884 hogs slaughtered during the same year 5,440, or .02 per cent., were affected. During 1906, 6,925,526 cattle were slaughtered under Federal inspection and 14,662 whole carcasses or parts condemned; 1,102,775 calves were slaughtered and 25 condemned; 8,223,630 sheep were slaughtered and 4 were condemned; 26,649,353 hogs were slaughtered and 208,887 condemned for tuberculosis. In old cows the percentage is much higher. In some cases 95 per cent. of the cows in large dairies have been found to be infected with tuberculosis. The percentage of infection in hogs keeps pace with the increase of the disease in dairy cows. If hogs are fed tuberculous milk or allowed to run behind tuberculous cattle they become infected to an alarming extent.

Symptoms of tuberculosis during life. There are only certain forms of the disease which show characteristic symptoms in the living animal (advanced pulmonary, intestinal, testicular, uterine, and mammary tuberculosis).

Frequent coughing of a weak, toneless character, emaciation, rough, lusterless, firmly attached skin, frequently recurring tympanites, and frequent return of estrum without conception are symptoms which should arouse suspicion. In advanced cases of pulmonary tuberculosis coughing and rapid, labored breathing are noted. In intestinal tuberculosis there may be acute diarrhea in addition to other symptoms. A painless, tough swelling of the testicles occurs when these organs are affected. A muco-purulent discharge from the vagina is noted in uterine tuberculosis, and a painless, hard

Fig. 134.—Tuberculous udder with greatly altered right hind quarter.

swelling of one or more quarters of the udder appears in tuberculous mammitis. The hind quarters of the udder are most often affected. Tuberculosis of the joints and lymph glands may also be recognizable during life. In tuberculous arthritis the joints are enlarged, hard and painless. Tuberculosis of the glands which may be palpated during life is comparatively rare. This form of the disease is characterized by swelling of the glands, which are uniformly hard and painless. In tuberculous meningitis the animal

shows a staggering gait or is unable to rise. The arthritic form of tuberculosis is the only one to be recognized in hogs during life.

Modes of infection and distribution of tuberculosis. The tubercle bacillus most frequently gains entrance into adult cattle with the inspired air (inhalation tuberculosis), into hogs and calves in milk and its by-products taken into the digestive tract (alimentary

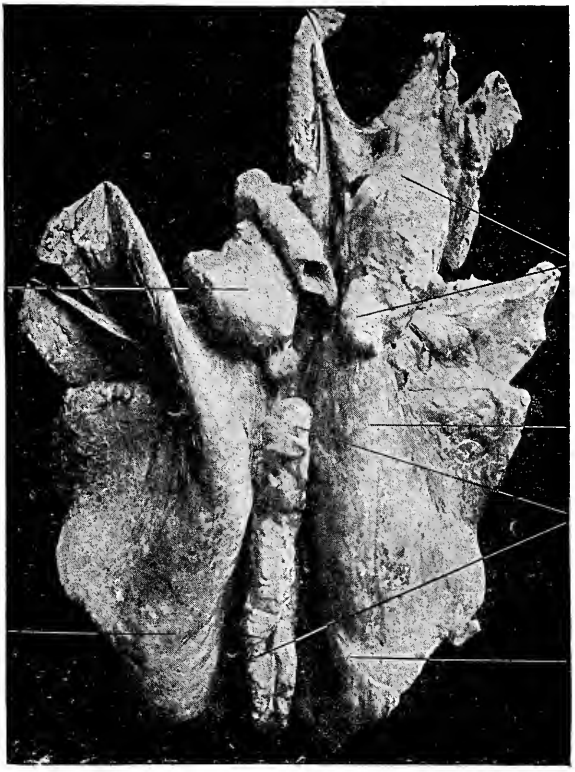


Fig. 135.—Beef lung affected with respiratory tuberculosis. The bronchial and mediastinal glands are greatly enlarged and filled with tuberculous foci. At points on the lung surface indicated by *a* there are tubercles which are found to be soft on section.

tuberculosis). Exceptionally tubercle bacilli infect hogs through castration wounds. In whatever part the tubercle bacillus becomes located, it multiplies and at first produces a miliary, transparent

Fig. 136.—Cross section of a beef lung showing tuberculous foci in the tissue and on the surface.

gray tubercle. The tubercle gradually becomes cloudy and is transformed centrifugally into a yellow, caseous and, later, calcareous mass, closely united with the surrounding tissue. This is the origin of the isolated tubercle. Calcareous tubercles emit a grating sound

Fig. 137.—Portions of beef intestines with tuberculous ulcers.

on section. By the formation of new tubercles in the surrounding tissue a nodule is developed, increasing in size to that of a pea, walnut, fist or even larger (Figs. 134–143). Tubercles on the mucosa tend to disintegrate after calcification, thus giving rise to

ulcers (Fig. 137). Under the influence of pyogenic bacteria such lesions in the lungs may become extensive pus cavities, characterized by large size, uneven, eroded surface, more or less fluid contents, and by the absence of a connective tissue capsule. Such necrotic foci may also form in the liver and mesenteric glands. Tubercles on the serous membranes, particularly the pleura and peritoneum,

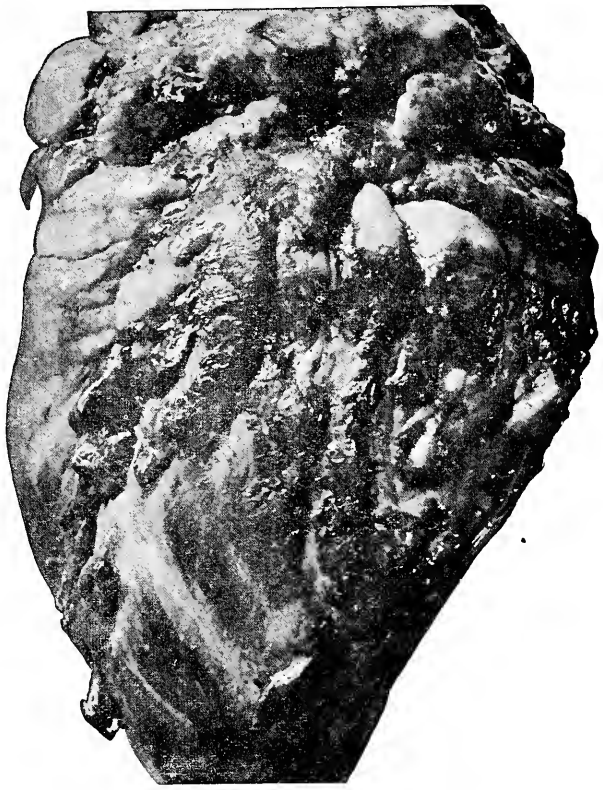


Fig.—138.—Heart with tuberculous proliferations on the surface.

show a tendency in cattle to form a tough connective tissue wall, and soon become calcified. This form of tuberculosis is known as pearl disease. It begins with reddish proliferations of the connective tissue on the surface of the pleura and peritoneum. Later these develop into tubercles and larger rough nodules or thick crusts (Figs. 138–140).

Some of the tubercle bacilli are always carried away by the lymph, thus producing new tubercles in the viscera, and soon giving rise to tuberculosis of the corresponding lymph glands (Figs. 141–143). The lymph glands regularly become affected after the tubercle bacilli reach the organs to which the glands belong. The glands become swollen, and small tubercles and larger casefied and calcified

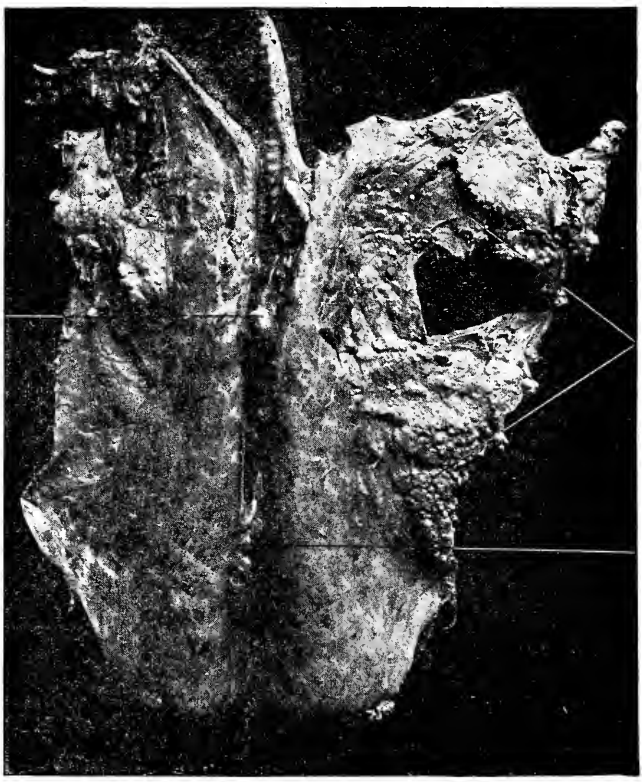


Fig. 139.—Beef lung with tuberculous foci on the pleura (pearl disease). Anterior and posterior mediastinal glands greatly enlarged.

nodules appear in them. On the other hand, there may be no demonstrable lesions in the organs to which the affected glands belong. For this reason it is important to examine the glands at the points of entrance of the tubercle bacilli.

The dissemination of tubercle bacilli from one part of the body to another may be brought about by swallowing the virus, by means of the lymph stream, or by means of the blood current.

As a result of swallowing tuberculous virus the glands of the pharynx, intestines and mesentery may become infected.

By means of the lymph stream intestinal tuberculosis may be carried to the peritoneum and thence to the pleura and uterus.

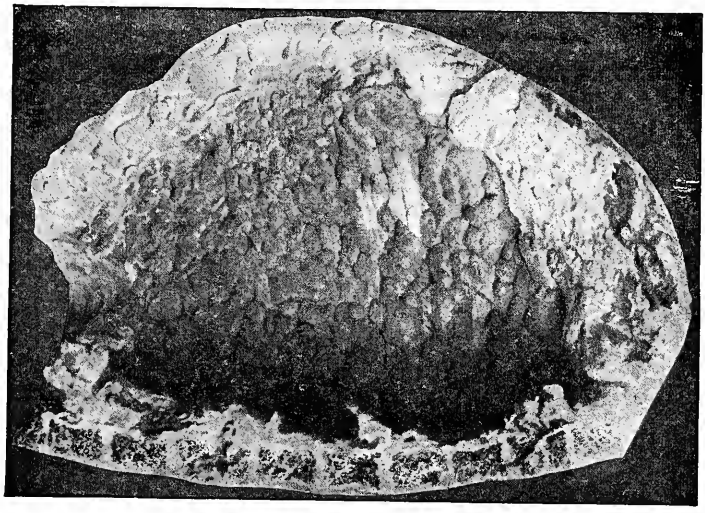


Fig. 140.—Right half of beef chest with tuberculosis of the pleura.

The blood becomes a carrier of tubercle bacilli whenever a tubercle breaks through the wall of a blood vessel and thus contaminates the blood, and also when a similar lesion occurs in a large lymph vessel directly connected with the blood circulation. If the systemic blood contains tubercle bacilli, they find their way into the muscles. As a matter of fact, they seldom become located in the muscle tissue, but they may infect the muscle lymph glands. If tubercles are found in viscera which can only become infected from the systemic blood (spleen, kidneys and their corresponding lymph glands), it may rightly be assumed that infection has become generalized through the blood system. If the lungs and liver or their lymph glands exhibit tuberculous lesions, the blood system may be suspected as the

agent of distribution of infection. The systemic blood carries tuberculous infection most frequently to the spleen, kidneys, udder, bones, joints and prescapular and precrural glands.

Tubercle bacilli in the blood are soon destroyed. If living bacilli are floating in the blood, we speak of it as a fresh blood infection. This condition is present when the spleen and lymph glands are swollen, and also when the hematogenous tubercles are only miliary in size.

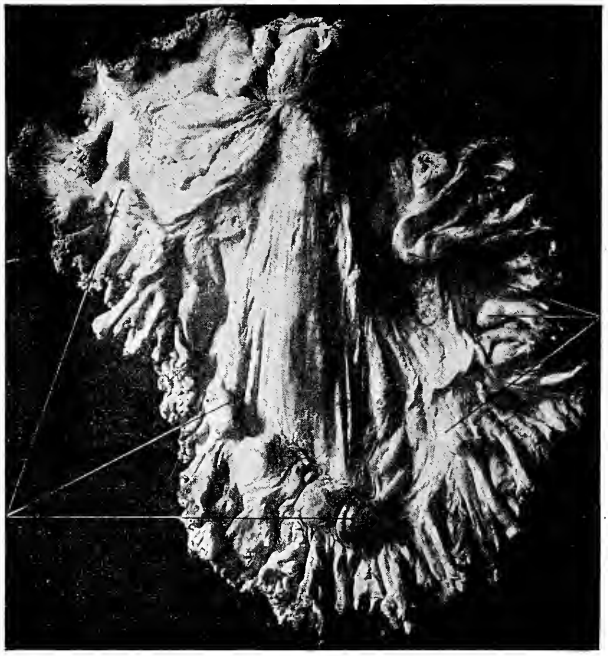


Fig. 141.—Mesentery of beef with tuberculosis of the mesenteric glands.

Tubercle bacilli may also be carried in the pulmonary and portal circulations. In this way a general pulmonary tuberculosis may arise, supplemental to a previous slight infection of the organ. Similarly, hepatic infection may arise from intestinal tuberculosis without the agency of the systemic circulation.

The extent of the distribution of the alterations in various parts or organs may vary greatly. Generalized tuberculosis in cattle is

most frequently seen on the pleura and peritoneum, which, with their duplicatures over the viscera, may be thickly studded with tubercles, nodules or crusts. Extensive alterations are also seen in the lungs and liver, which may become in large part destroyed.

Post-mortem findings. In cattle the lungs or their lymph glands are affected in most cases. Small tubercles, larger, casefied or calcified nodules, and small and large necrotic lesions are found in the

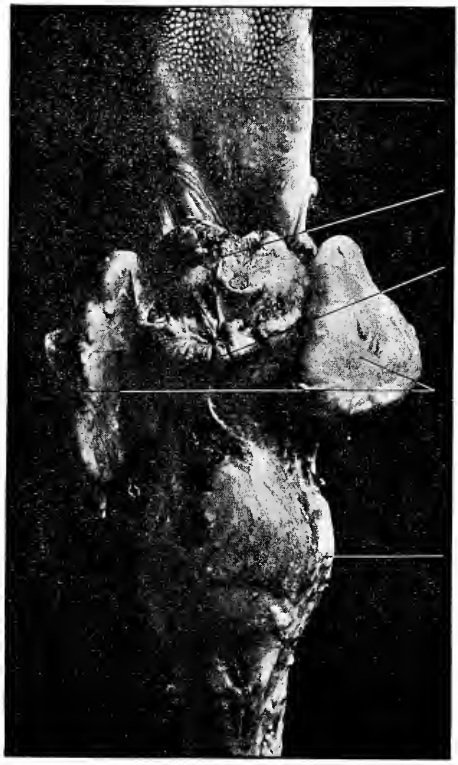


Fig. 142.—Tuberculosis of the pharyngeal glands in cattle.

lungs. If pus cavities are present, there may also be ulcers on the tracheal mucosa and purulent foci under it. These lesions are exposed to view by opening the trachea along the upper border. Quite frequently in cattle merely the pulmonary and mediastinal glands are tuberculous, without evidence of infection of the lungs or other parts commonly examined.

Tuberculosis of the pleura and peritoneum is a frequent form of the disease in cattle (Fig. 140). In hogs, however, the involvement of the serous membranes is rare. From the pleura infection may spread to the pericardium (Fig. 138). In pleural and peritoneal tuberculosis the coverings of the diaphragm and spleen are often badly affected. In pleural tuberculosis the mediastinal glands are regularly affected (Fig. 135). In tuberculosis of the peritoneum

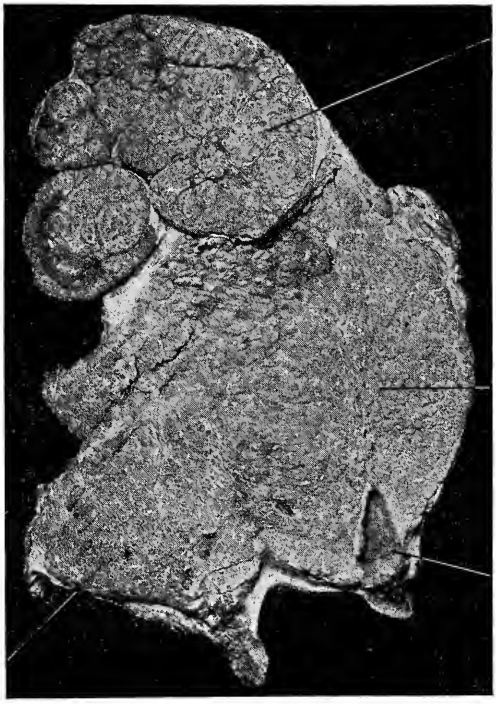


Fig. 143.—Tuberculosis of the cow's udder. The right hind quarter affected.

the corresponding glands are affected (iliac, vertebral, posterior mediastinal), depending upon the location of the disease on the peritoneum.

Tuberculous alterations of the intestinal mucosa (tubercles and ulcers) are rare, but the mesenteric glands are frequently affected.

Tuberculous lesions in the liver are in the form of small tubercles and larger casefied and calcified nodules, less often necrotic centers.

The portal lymph glands may be affected in the absence of demonstrable lesions in the liver tissue. In slaughtering hogs the portal glands are often inadvertently cut away from the liver, and remain attached to the stomach or pancreas by means of the mesentery.

The spleen of young cattle and hogs may exhibit small or large round tubercles. In contrast with the spleen, the kidneys are more frequently affected in older animals. Renal lesions range from the

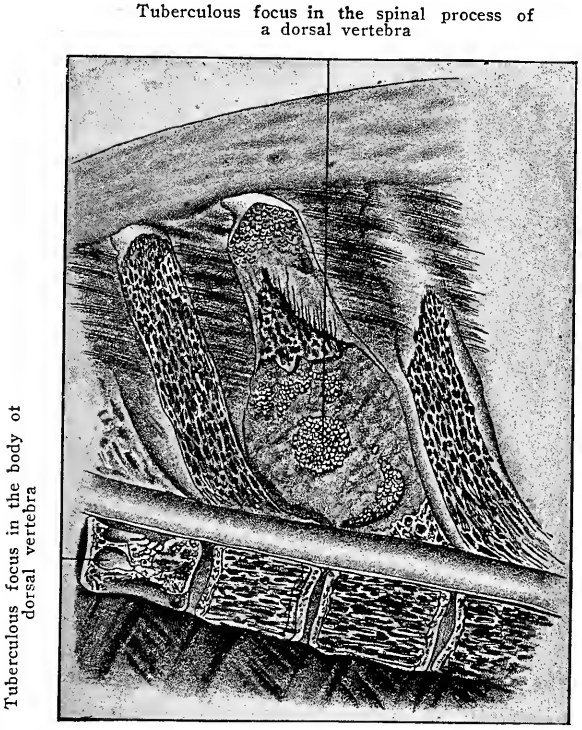


Fig. 144.—Vertebral column of hog with tuberculosis of some of the vertebræ.

minutest tubercles to the complete caseation of large parts of the organ. In tuberculosis of the spleen and kidneys the splenic glands in the gastro-splenic ligament, and the renal glands are affected.

Tuberculous alterations of the tongue are rare, but in hogs the submaxillary glands, and in cattle the post-pharyngeal glands (Fig. 142) are frequently tuberculous. In about 92 per cent. of tuber-

culous hogs the upper cervical or pharyngeal glands are affected. The gastric mucosa is rarely involved.

The testicles and penis occasionally show tuberculous lesions. The testicles become enlarged and filled with caseous pits, or are transformed into a cheesy mass. The superficial inguinal glands are simultaneously affected (Figs. 37 and 42). If the penis become infected, ulcers or nodules develop in the prepuce.

The ovaries, oviducts, uterus and udder may become tuberculous, rarely also the vagina. Enlargement and caseous deposits are the chief symptoms in the ovaries. The oviducts become transformed into thick, stiff strands. Tubercles appear on the outer covering and the wall of the uterus, and both tubercles and ulcers in the uterine mucosa. In cases of uterine tuberculosis the internal iliac glands are affected (Fig. 37). The tuberculous udder becomes enlarged and the normal yellow tissue is transformed into a gray or grayish yellow tissue, which exhibits tubercles and large nodules on section. The supramammary glands are also affected (Fig. 96).

The brain and spinal cord are seldom affected with tuberculosis. On the other hand, the cerebral and spinal meninges may show tubercles and larger nodules. Such infection is disseminated by the systemic blood.

The bones are rarely tuberculous in cattle, but quite frequently so in hogs. Tuberculous swellings of bones are so soft that they may be cut with a knife. If the appendicular skeleton is affected, tuberculous lesions regularly appear in the muscle lymph glands (prescapular, axillary, popliteal, precrural, ischiatic, iliac, lumbar, superficial inguinal glands, Figs. 36–43). Tuberculosis of the vertebræ or ribs is at once apparent when the carcass is cut into halves. In the vertebræ yellow masses of tissue displace the bone tissue (Fig. 144). If the dorsal vertebræ are affected, the glands which lie under them are also tuberculous (Fig. 37). Tuberculous ribs exhibit soft thickenings of the size of a hen's egg. The structure of these swellings is the same as in affected vertebræ (Fig. 102). In costal tuberculosis the vertebral and prescapular glands are regularly affected.

In inspection of cattle, calves and hogs for tuberculosis the pulmonary, submaxillary, cervical and mesenteric glands are to be ex-

amined and incised. In determining the extent of infection examination may be made of the popliteal, ischiatic, superficial inguinal, precrural, iliac, lumber, prescapular and axillary glands, and then the back bone, ribs and viscera. Unnecessary incision of tuberculous glands or parts is to be avoided.

For the methods of procedure with tuberculous parts or carcasses see the Federal regulations in Chapter IX.

Lung worms in the lungs of sheep may often produce tubercles with a cloudy yellow center. These lesions may be easily distinguished from those of tuberculosis by the absence of infection of the lymph glands.

2. Caseous Lymph-Adenitis of Sheep

This disease, also known as pseudo-tuberculosis, quite frequently occurs in old sheep, less often in lambs. The symptoms in the living animal are not characteristic. Sometimes the prescapular and precrural glands are enlarged. Lesions are also found post mortem in other glands, viz., superficial inguinal, bronchial, mediastinal, sublumbar, deep inguinal and scrotal. The retropharyngeal and submaxillary glands are seldom if ever affected.

Glands infected with the disease become enlarged, and the section surface is watery. Later degeneration takes place in concentric layers, and finally the whole gland becomes a sac filled with greenish pus, the contents resembling in this respect the nodules produced by *Œsophagostoma columbianum*. The lungs may be studded with nodules of the size of a pea, and the spleen and liver may contain the characteristic sacs filled with a greenish yellow material. Several thousand cases are annually observed, but comparatively few are serious enough to lead to condemnation. In 1906 only 680 carcasses were condemned out of a total of more than 8,000,000 sheep slaughtered.

3. Actinomycosis

Actinomycosis is due to infection with the ray fungus. In cattle the disease is found chiefly in the tongue, mucosa of the mouth, jawbones and connective tissue in the intermandibular space, ex-

ceptionally also in the larynx, lungs, rumen and intestines. The tongue becomes enlarged and indurated, red fungoid nodules appear

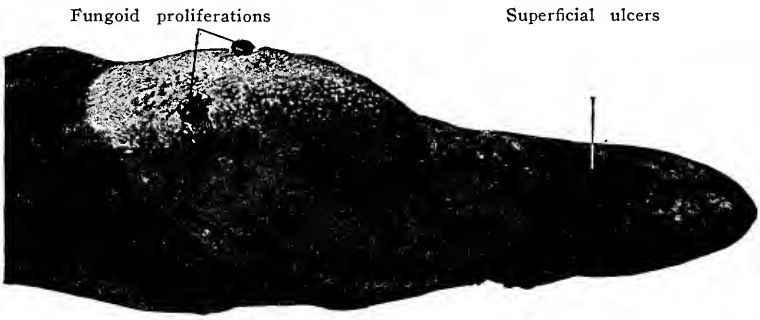


Fig. 145.—Wooden tongue of beef with fungoid proliferations and superficial ulcers.

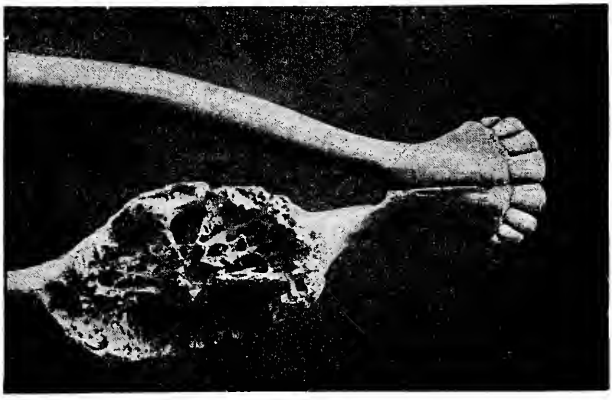


Fig. 146.—Lower jaw of beef affected with actinomycosis.

on the mucosa of the mouth (Fig. 145), and swellings develop in the jawbones (Fig. 146). In advanced cases of wooden tongue,

prehension of food is so difficult that the general condition of the animal is disturbed.

In hogs the udder is most often affected. In the udder, pus foci form, containing small granular structures or nodules which often break through to the surface, forming small fistulæ.

In cattle superficial ulcers appear on the mucous membrane of the tongue and small tubercles under it and in the musculature. The tongue lesions are located at the junction of the body and tip of this organ. At this point lesions are found in 8 to 10 per cent.

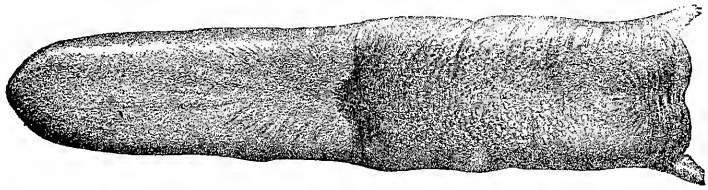


Fig. 147.—Beef tongue affected with actinomycosis at the line between the body and tip of the tongue (a).

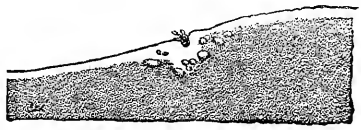


Fig. 148.—Section through the affected part of Fig. 147.

of actinomycotic cattle. The corresponding lymph glands are swollen, but free from actinomyces.

Actinomycosis is commonly of local distribution. Generalization of the disease involving the vertebræ and muscle lymph glands is very rare. The head and tongue are condemned, but the rest of the carcass is passed if the disease has not extended from the primary infection.

4. Coital or Vesicular Exanthema

Coital exanthema is an infectious eruption on the mucosa of the vulva, prepuce and penis. In mild cases the general condition of the animal is not affected. Lentil-sized vesicles filled with a clear yel-

lowish fluid appear on the inner surface of the labia and on the penis. The vesicles burst, leaving flat, circular, superficial ulcers, which soon desquamate and become cicatrized. In acute cases there is fever and the ulcers are deeper. Mild cases do not affect the wholesomeness of the meat.

5. Foot-and-Mouth Disease

In 1902, and again in 1908, an outbreak of foot-and-mouth disease occurred in New England. It was promptly eradicated by

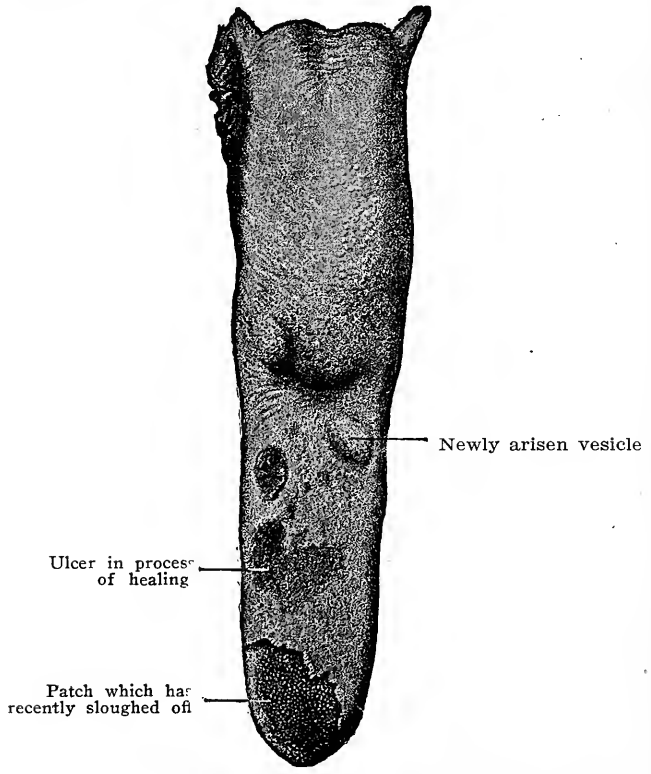


Fig. 149.—Beef tongue affected with foot-and-mouth disease.

the Bureau of Animal Industry in coöperation with State authorities. At present there are no cases in this country.

The disease attacks cattle, goats, sheep and hogs, spreads rapidly, and is characterized by the formation of vesicles followed by ulcers on the mucosa of the mouth and on the feet. Affected cattle exhibit fever, loss of appetite, dribbling of saliva and smacking of the lips. Vesicles appear on the upper jaw, tongue, lips and other parts of the mouth. After rupture they leave ulcers or spots without mucosa (Fig. 149). At the crown and in the cleft of the hoof similar vesicles appear. After rupture the areas become covered with crusts. In sheep and goats the disease is less common and the

Fig. 150.—Beef foot showing favorite locations of lesions of foot-and-mouth disease.

lesions are chiefly on the feet. Similarly in hogs the feet are affected more often than the mouth.

The disease is transmissible to man. The inspector is not likely to see a case, however, for in the event of another outbreak the cases would be instantly quarantined and destroyed.

6. Swine Erysipelas

Swine erysipelas is a bacterial disease which assumes a serious form in Europe. Red spots appear on the under parts of the body,

inner aspect of the thigh, neck and ears. The spots are at first light red, later dark red, bluish or brownish red, and may become confluent. The feces are at first hard, later thin, slimy or bloody. The redness of the skin becomes more conspicuous after scalding. The digestive mucosa is reddened and swollen. Spleen and liver are also swollen, the former appearing bluish red and the latter grayish red. Kidneys are enlarged and reddened with evidences of hemorrhagic

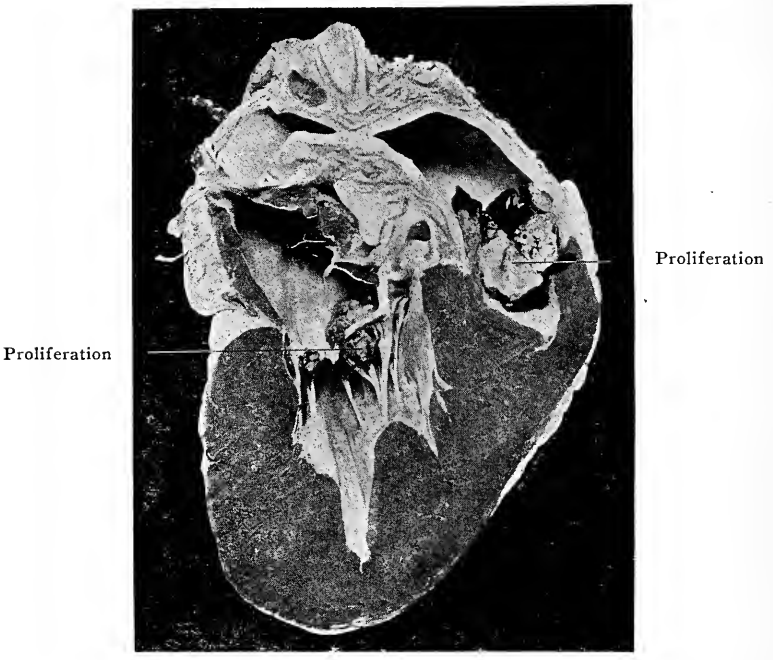


Fig. 151.—Hog heart proliferations on the valves following swine erysipelas.

nephritis. The mesenteric glands are swollen and often show hemorrhages. The meat may become softened and discolored grayish red. Swine erysipelas has not been recognized in this country.

7. Urticaria or Diamond Skin Disease

Urticaria, according to some European writers, is a special, mild, dermal form of swine erysipelas, the pathogenic bacteria being found

not in the blood, but in affected parts of the skin. In this country numerous examinations of these skin diseases have failed to reveal the bacillus of swine erysipelas. Sharply delimited red or bluish red spots of circular or quadrangular form appear on the skin. The spots are slightly elevated and are conspicuous after scalding and

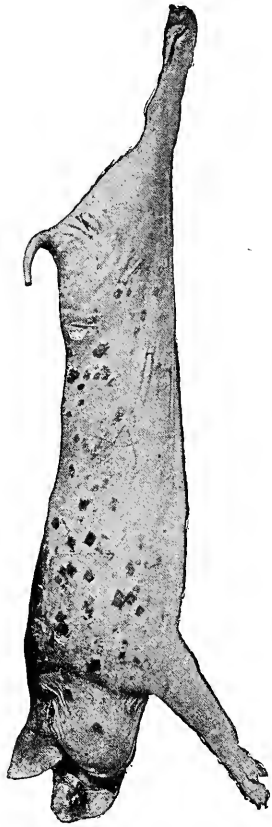


Fig. 152.—Hog affected with urticaria.

scraping the hogs. Carcasses of hogs affected with urticaria may be passed after detaching and condemning the skin.

8. Swine Plague

Swine plague is an infectious inflammation of the thoracic organs (lungs, pleura and heart). It attacks chiefly young pigs and oc-

curs often in connection with hog cholera. In acute cases of swine plague, coughing, dyspnea, loss of appetite, slight redness of the skin and fever are noted. In chronic swine plague, coughing, poor appetite, defective development, gummy eyes and a skin eruption (pitchy mange) are observed. The general condition may not be affected in old hogs.

Affected (inflamed) anterior lobes of lungs

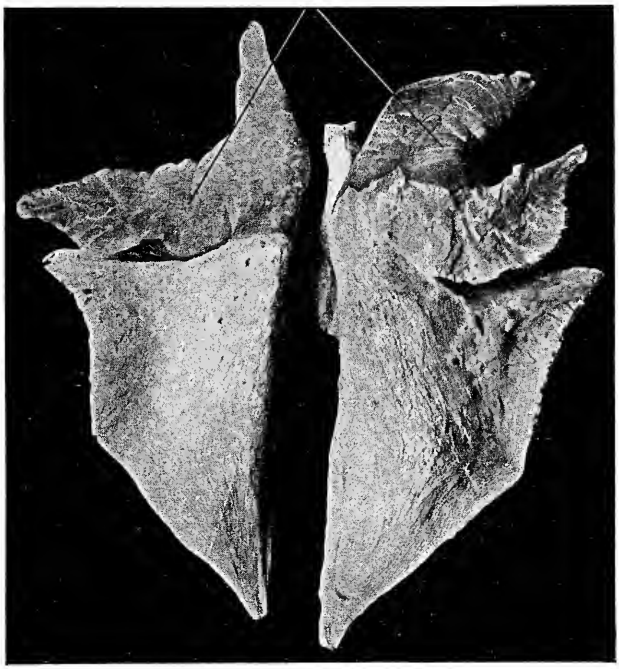


Fig. 153.—Hog lungs with chronic swine plague, anterior lobes affected.

In post-mortem inspection inflammatory areas are found in the lungs. The inflamed portions do not collapse after removal from the thorax, possess a dark red, grayish red or gray color, and feel firm like the liver. In acute cases large portions of the lungs and pleura are inflamed, and often covered with a separable false membrane, as is also the pericardium. Adhesions may thus come about between the lungs and the walls of the chest, and between the heart and

pericardium. The lymph glands at the base of the lungs are swollen and inflamed. As a rule in chronic cases only certain lobes of the lungs, particularly the anterior, are inflamed, and become grayish red or gray, firm and tough (Fig. 153). The glands at the base of the lungs are simultaneously swollen. Cicatrizations, encapsuled pus foci and connective tissue adhesions may be among the sequelæ of swine plague.

Regarding the disposal of affected carcasses see the Federal regulations in Chapter IX.

9. Septicemia

Septicemia and pyemia are the most important animal diseases from the standpoint of meat inspection, for the consumption of the meat in such cases may cause meat poisoning. Septicemia or puriform blood poisoning is a wound infection. The pathogenic organisms may penetrate through any diseased part of the outer skin, mucosa of the uterus, respiratory or digestive organs, or through the unhealed navel. Septicemia may be associated with external injuries to the joints, feet, tendons and other parts; with inflammation of the navel; with hemorrhagic enteritis of calves and adult cattle; with septic metritis; with malignant mammitis of cows; with septic pleuritis and peritonitis, etc.

The symptoms during life are not characteristic. Septicemia may be suspected, however, in cases of high fever (subnormal toward the end of fatal cases), great disturbance of the general condition, and extreme weakness.

The post-mortem lesions of septicemia are cloudy grayish yellow discoloration of the liver and kidneys, cloudy gray discoloration of the myocardium (like boiled meat), punctiform hemorrhages under the serous membranes, swelling and bloody-watery infiltration of the lymph glands. Carcasses showing septicemic lesions are condemned.

10. Pyemia

Pyemia is also a wound infection. It is often associated with septicemia, and arises as a result of translocation by the blood current of pyogenic bacteria from a local pus focus. The pyogenic

organisms become located chiefly in the lungs, spleen, kidneys, liver, joints, bones and muscles, and produce new pus foci, which may become encapsuled, or extend, break into the blood circulation and lead to new foci. The most frequent forms of pyemia are purulent umbilical phlebitis in calves, purulent pulmonary inflammations in calves, sheep and goats, and purulent osteomyelitis.

The symptoms during life are great depression, poor appetite, alternate febrile and subnormal temperature, discharge of pus from the point of infection, and suppuration in the joints, especially in calves.

The inspector can ordinarily determine the original focus of the disease. Cloudiness of the heart, liver and kidneys is noted as in septicemia, also swelling of the spleen, petechiæ in the kidneys, and fresh non-encapsuled pus foci in various parts, particularly the lungs, spleen, kidneys, liver, joints, bones and muscles. Carcasses showing pyemic lesions are condemned.

The extensive literature of meat poisoning has been well summarized by Ostertag in his Handbook of Meat Inspection. Pathogenic bacteria in meat are killed by thorough cooking. The dangerous toxins developed in septicemia and pyemia, however, are not always thus destroyed. It is highly important, therefore, that all cases of septicemia and pyemia should be detected and condemned.

11. Tetanus

Tetanus is a wound infection, characterized by a stiff carriage of the head and neck and, in acute cases, also of the tail and extremities. Tetanus is commonly associated with wounds in the outer skin or, in cows, with wounds in the uterus. In new-born animals, particularly lambs, tetanus may take its origin from a navel wound. Carcasses of animals which showed ante-mortem symptoms of tetanus are condemned.

12. White Scours

White scours is an infectious gastroenteritis affecting calves and, less often, lambs. During life there is a persistent diarrhea with oleaceous, bright yellow or greenish, later white, thin, malodorous

feces. The diarrhea begins within the first few days after birth, and usually leads to death within two or three days. The post-mortem lesions include great emaciation, confluent erythrism on the intestinal mucosa, swelling and bloody-watery infiltration of the mesenteric glands, small hemorrhages on the serous covering of the heart, pleura and peritoneum, and dirty red color and watery character of the musculature. When these lesions are present, the meat is unfit for food.

13. Necrotic Stomatitis or Diphtheria of Calves

Necrotic stomatitis is an infectious disease of the anterior part of the digestive tract and air passages. Diphtheritic desquamation occurs on the mucosa. The pathogenic organisms of the disease cause deep inflammation and desquamation of the mucosa of the mouth, pharynx, and often of the larynx, trachea, esophagus and rumen. Affected calves show swellings on the cheeks, salivation, diminished appetite, and fever. Following upon the alterations in the mucosa, acute pulmonary inflammation and septicemia may develop, causing the death of the animal. The post-mortem lesions include inflammation of the above-mentioned mucosa and sharply delimited, grayish yellow, ruptured foci, which leave ulcers.

14. Anthrax

Anthrax is an infectious disease in which the bacteria are found in the blood. It occurs chiefly in cattle, sheep and goats, less often in swine. As a rule, sheep die suddenly without showing previous symptoms. Cattle may live from a few hours to two days. The symptoms in cattle include restlessness, excitement or depression, muscular tremor, high fever, dyspnea, rough coat, loss of appetite, slight tympanites, and admixture of blood with the excretions. Swellings sometimes rapidly develop on the surface of the body, being at first hot and painful and later cold and painless.

The blood is dark red and tarlike. The muscles may be dark red, soft and filled with hemorrhages. Yellow gelatinous masses, yellow watery fluid or red gelatinous deposits may be found under the skin. In most cases the spleen is uniformly or clavately swollen,

blackish red and soft, disclosing tarlike blood on section. Petechiæ are noted under the serous membranes, particularly of the heart, and in the inflamed intestinal mucosa. In hogs the whole connective tissue of the neck is infiltrated. These symptoms are not uniformly all present at once. Dependence can be placed on swelling and softening of the spleen, bloody diarrhea, swelling of the intestinal mucosa with blood points or streaks, and chocolate-colored intestinal contents.

All carcasses showing lesions of this disease are condemned and immediately tanked.

15. Blackleg

Blackleg is an infection which is stationary in certain regions. It affects almost exclusively cattle between the ages of six months and two years, rarely occurring in sheep and other animals. In nearly all cases the disease proves fatal within one and one-half to three days. High fever and great depression are noted during life. Flat, doughy swellings, which emit a crackling noise when stroked, develop rapidly on the thighs, neck, shoulders, breast, back and rump.

Gas and blood are found in the subcutaneous swellings, and between and in the muscles. The adjacent musculature is discolored dirty brown or black, and has a putrid or rancid odor. Carcasses of animals showing lesions of blackleg are condemned.

16. Hemorrhagic Septicemia

This disease attacks cattle and other domestic and wild animals. It has often been wrongly diagnosed as cornstalk disease, blackleg, anthrax, or cerebrospinal meningitis. The characteristic lesions of the disease consist of hemorrhages in the subcutaneous, subserous and muscular tissues, lymph glands and viscera. The hemorrhages vary in size from a point to an inch in diameter.

In the superficial form of hemorrhagic septicemia high fever is noted, and also extensive, hot, firm swellings on the head, neck and dewlap. Death occurs within 12 to 36 hours. In the carcass alterations resembling those of anthrax are found, especially the bloody-

watery exudations in the subcutaneous connective tissue, small hemorrhages in all organs and grayish brown discoloration of the liver, kidneys and heart. The spleen, however, is always unaltered. In the pectoral form the pulmonary pleura is inflamed and there are small hemorrhages in the thoracic organs. The intestinal form is often associated with the other forms of the disease and is characterized by bloody feces. All carcasses of animals affected with this disease are condemned.

17. Rabies

Rabies is an infectious disease which may be transmitted by the bite of rabid animals, especially dogs, to other animals and man. Rabid ruminants and swine are very restless, bellow, bleat or grunt, and become rapidly emaciated and paralyzed in the hind quarters. The course of rabies varies from three to seven days. There are no conspicuous post-mortem lesions. Carcasses of animals which showed ante-mortem symptoms are condemned.

18. Pleuropneumonia

This disease was once quite generally distributed over the eastern

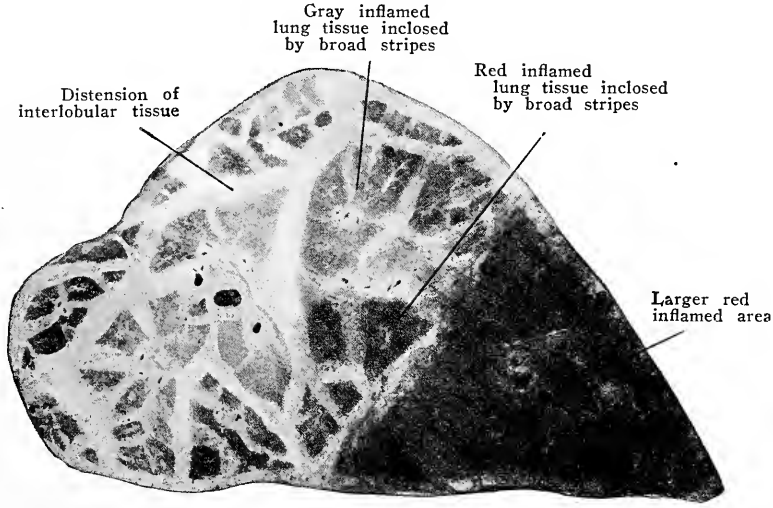


Fig. 154.—Portion of beef lung affected with pleuropneumonia.

and central States. It was finally eradicated by the Bureau of Animal Industry in coöperation with State authorities, and no case has been known in the country since 1892. The characteristic pulmonary lesions are seen in Figs. 154 and 155.

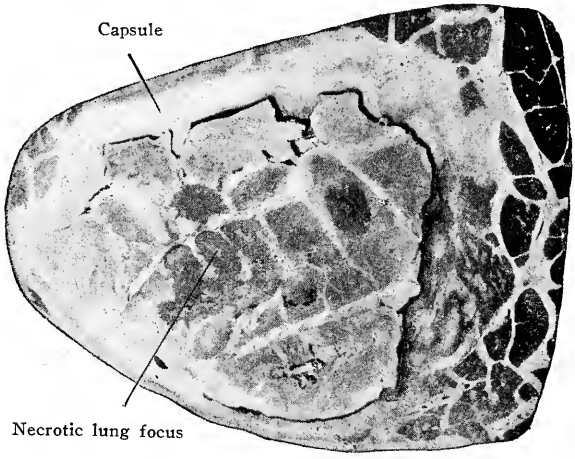


Fig. 155.—Necrotic lung focus in pleuropneumonia.

19. Hog Cholera

Hog cholera is an infectious inflammation of the intestines. The virus of the disease produces acute inflammation of the mucosa of the digestive organs and also of the skin.

The symptoms during life are dejection, poor appetite, constipation, later stinking diarrhea, emaciation, often gummy eyelids, and pitchy mange.

Post mortem, superficial and deep, gray and grayish yellow erosions are noted in the alimentary tract, particularly in the cecum and colon (Figs. 156 and 157). These lesions appear in the form of tubercles, larger plates, roundish buttons and ulcerous inflammations of varying depth. The spleen is generally injected and swollen, the kidneys contain pin-point hemorrhages and the bone marrow is at times dark red in color. Moreover, the mesenteric glands are hemorrhagic. In recovered animals we may observe caseation of the

mesenteric glands, adhesions between the folds of the intestines and scars in the intestinal mucosa.

Carcasses showing well-marked and progressive lesions in more than two organs are condemned.

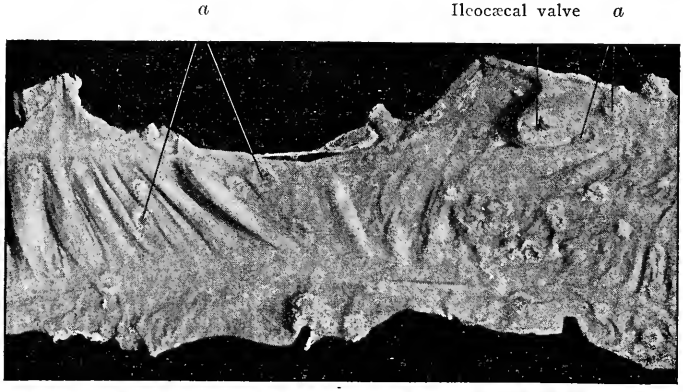


Fig. 156.—Hog cholera. Large intestine with small lentil-sized ulcers (*a*).

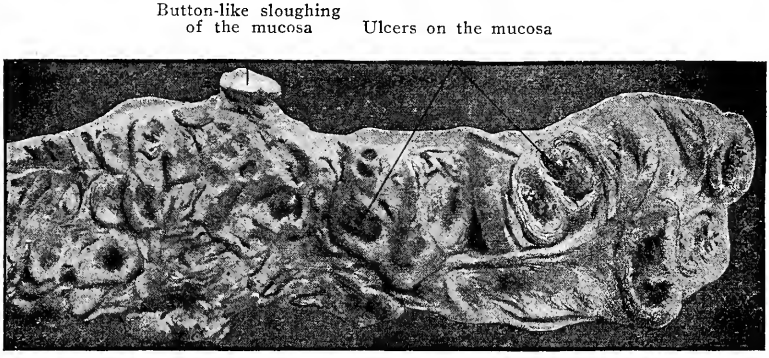


Fig. 157.—Hog cholera. Large intestine with extensive deep alterations.

20. Malignant Epizootic Catarrh

This is an infectious disease of cattle. During life a discharge from the eyes and nose is observed, and also a wheezing respiratory sound. The eyes may be cloudy and swollen. The fever is not always high. The nasal mucosa is reddened and covered with a deposit.

The alimentary tract, bladder and vagina may also be inflamed. In cases of generalized inflammation of the mucous membranes the carcass is condemned.

21. Texas Fever

Texas fever is a contagious protozoan disease of cattle carried from one animal to another by means of cattle ticks. The symptoms include high fever, thinness and paleness of the blood, loss of appetite, constipation, and usually in acute cases hemoglobinuria. The last symptom is absent in chronic cases. Ticks are to be found on the skin, particularly on the inner aspect of the thighs. The subcutaneous tissue may be yellow and swollen on the under surface of the body. The omentum often shows hyperemic patches. The spleen is greatly enlarged, the Malpighian bodies and trabeculæ being obscured in the dark brownish-red pulp. The liver is enlarged, with rounded borders, and distended bile ducts. The parenchyma of the organ is pale and exhibits fatty degeneration. The gall bladder contains an unusual quantity of thickened or otherwise altered bile. Pigment may be observed throughout the liver, kidneys and spleen. The blood is thin and pale as a result of the destruction of the blood corpuscles. Carcasses showing lesions of this disease are condemned.

22. Parasitic Icterohematura of Sheep

This is a protozoan disease affecting only sheep. Affected sheep show an arched back and unsteady gait. The visible mucosæ are yellow and the urine is bloody. Dropsical swellings appear on the ears, face, neck, and thighs. The skin, connective tissue, and fat are yellow and the muscles pale. The blood is thin and watery, and the alimentary tract icteric. The liver is congested and deep yellow in color. The kidneys are enlarged, bluish black, and exude a chocolate-colored liquid on section. Yellowish or yellowish-green effusions may be observed in the head, neck and thighs. Petechiæ occur on the pericardium. Carcasses affected with this disease are condemned.

Disposal of Dead and Dying Animals

All animals which die in the abattoir pens or which are in a dying condition at the time of slaughter are condemned. See also the Federal regulations in Chapter IX. In this respect the German meat-inspection regulations are far less stringent, for they permit the inspector to pass the carcasses of animals about to die from injuries or from bloody diarrhea, mammitis, tympanites, swine erysipelas, etc. In the Federal inspection service meat is either passed or condemned, while in Germany there are three classes or qualities of passed meat, viz., "fit for food," "qualifiedly fit for food" (after sterilization), and "depreciated." In the German system, therefore, it is necessary to draw distinctions (sometimes necessarily arbitrary) between four classes of meat. Protection of the meat consumer is thereby rendered more difficult and the work of inspection becomes more complicated.

Alterations in Meat During and After Slaughter

Meat of the best quality may undergo harmful alterations during and after slaughter. In careless slaughtering, such as may occur in country slaughterhouses without inspection, the meat may become contaminated with gastric or intestinal contents, bile, purulent material or other kinds of filth. Meat may soon become infested with the larvæ of flies or with other insects. In close, damp rooms molds may rapidly cover the surface of meat with a fungous felt. Even phosphorescent bacteria may find lodgment on meat.

If carcasses are not exenterated immediately after slaughter, bacteria may penetrate into the meat from the intestines and set up harmful changes. Decomposition soon sets in on the surface of meat if it is not kept under sanitary conditions. Moreover, meat readily absorbs the odors of tobacco, carbolic acid and other aromatic substances.

None of the above-mentioned conditions can occur in an abattoir under Federal inspection. See the regulations in Chapter IX on sanitation of abattoirs and on reinspection of passed parts and carcasses.

CHAPTER VIII

Preservation of Meat—Tanking of Condemned Meat

Preservation of Meat

Meat may be preserved by salting, pickling, smoking, or by holding in cold storage. The Federal regulations forbid the use of any chemical or dye other than common salt, sugar, wood smoke, vinegar, pure spices, and, pending further inquiry, saltpeter.

The effects of various chemicals, the methods of preservation, and the principles and practice of cold storage are exhaustively discussed in the Handbook of Meat Inspection. It seems unnecessary, therefore, to consider those matters further in this connection.

Tanking Condemned Meat

In Germany much meat which cannot be passed unqualifiedly is sterilized by heating it in a suitable receptacle so that the internal temperature remains at 80° C. for at least ten minutes. A small apparatus used for this purpose is shown in Fig. 158.

According to our Federal regulations all condemned carcasses, parts of carcasses or meat-food products are tanked. Tankage has become one of the important by-products of the modern packing house. The method of operating the tanks is described in the following quotation from a report by Dr. Melvin.

"Reference has been made to condemning carcasses and meats to the tanks. The law orders the Secretary of Agriculture to destroy for food purposes all carcasses or parts which are found unfit for food. All large establishments provide tanks for this purpose, as in this way the grease may be saved for soap and other non-edible products and the remainder for fertilizer. Tanks vary in size with the size of the establishment and its volume of business. They are of metal and extend through two or more floors of the house. From the nature of their usage they must be very strong and tight. Government employees first

seal the lower opening of the tank. They then see that condemned carcasses, parts, and meat products are put in, along with offal, or coloring matter. They attend to closing and sealing the top, closing and sealing the draw-off valves, see that steam is turned into the tank, and require it to be maintained at a certain pressure for a prescribed time. A pressure of 40 pounds is usually used. This produces a temperature of 280° F., and, maintained for eight to ten hours, is sufficient to liberate all the grease and even to disintegrate the bones. Inspectors watch also

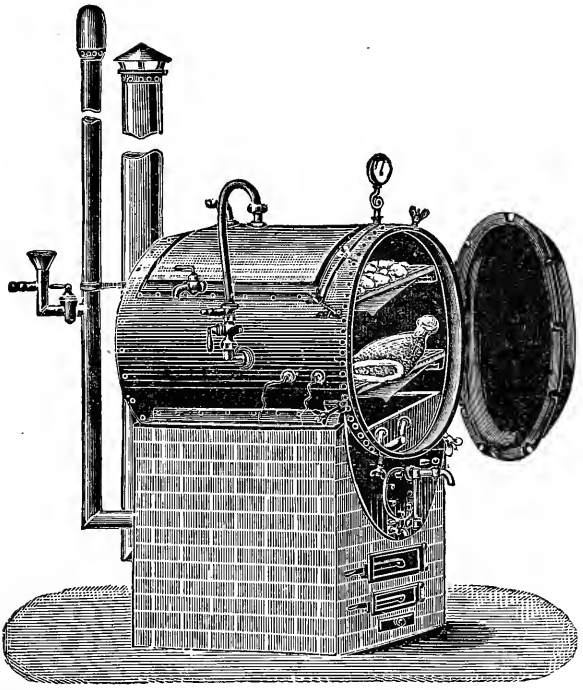


Fig. 158.—Small steam cooking apparatus with direct steam production for use in small communities.

the drawing off, which is done by means of valves located at intervals along the sides of the tank, and they mark the containers in which the product is stored and shipped with the word 'inedible.' All possible precautions are taken to prevent this grease, some of which looks about as good as some lard, from going into trade as edible product."

Among the products from the tanks or digesters mention may be made of fats for use in machine oils and soaps, animal meal, concentrated tankage, and fertilizer.

CHAPTER IX

Legal Regulation of Meat Inspection in the United States

The first Federal meat-inspection law in the United States was passed on March 3, 1891. This law provided for the inspection of live cattle, hogs and the carcasses and products thereof which were the objects of interstate commerce. According to the law of 1891 the Secretary of Agriculture was directed to cause an ante-mortem inspection of all cattle, sheep and hogs to be slaughtered for interstate trade or foreign commerce. The law also provided that post-mortem inspection might be put in operation in institutions where it was deemed expedient. Under this law there finally came to be employed about 1,500 persons on the inspection force in 160 abattoirs in 50 cities. An amendment passed in 1895 gave authority to prevent commerce in condemned parts and carcasses.

The Federal law now in force was passed June 30, 1906. This law came largely in response to the repeated recommendations of the officials of the Bureau of Animal Industry. A copy of the law follows, together with the revised regulations governing the Federal meat-inspection service.

Extract from an act of Congress entitled "An act making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and seven," approved June 30, 1906 (34 Stat., 674).

THE MEAT INSPECTION AMENDMENT

That for the purpose of preventing the use in interstate or foreign commerce, as hereinafter provided, of meat and meat food products which are unsound, unhealthful, unwholesome, or otherwise unfit for human food, the Secretary of Agriculture, at his discretion, may cause to be made, by

inspectors appointed for that purpose, an examination and inspection of all cattle, sheep, swine, and goats before they shall be allowed to enter into any slaughtering, packing, meat-canning, rendering, or similar establishment, in which they are to be slaughtered and the meat and meat food products thereof are to be used in interstate or foreign commerce; and all cattle, swine, sheep, and goats found on such inspection to show symptoms of disease shall be set apart and slaughtered separately from all other cattle, sheep, swine, or goats, and when so slaughtered the carcasses of said cattle, sheep, swine, or goats shall be subject to a careful examination and inspection, all as provided by the rules and regulations to be prescribed by the Secretary of Agriculture as herein provided for.

That for the purposes hereinbefore set forth the Secretary of Agriculture shall cause to be made by inspectors appointed for that purpose, as hereinafter provided, a post-mortem examination and inspection of the carcasses and parts thereof of all cattle, sheep, swine, and goats to be prepared for human consumption at any slaughtering, meat-canning, salting, packing, rendering, or similar establishment in any State, Territory, or the District of Columbia for transportation or sale as articles of interstate or foreign commerce; and the carcasses and parts thereof of all such animals found to be sound, healthful, wholesome, and fit for human food shall be marked, stamped, tagged, or labeled as "Inspected and Passed"; and said inspectors shall label, mark, stamp, or tag as "Inspected and Condemned," all carcasses and parts thereof of animals found to be unsound, unhealthful, unwholesome, or otherwise unfit for human food; and all carcasses and parts thereof thus inspected and condemned shall be destroyed for food purposes by the said establishment in the presence of an inspector, and the Secretary of Agriculture may remove inspectors from any such establishment which fails to so destroy any such condemned carcass or part thereof, and said inspectors, after said first inspection shall, when they deem it necessary, reinspect said carcasses or parts thereof to determine whether since the first inspection the same have become unsound, unhealthful, unwholesome, or in any way unfit for human food, and if any carcass or any part thereof shall, upon examination and inspection subsequent to the first examination and inspection, be found to be unsound, unhealthful, unwholesome, or otherwise unfit for human food, it shall be destroyed for food purposes by the said establishment in the presence of an inspector, and the Secretary of Agriculture may remove inspectors from any establishment which fails to so destroy any such condemned carcass or part thereof.

The foregoing provisions shall apply to all carcasses or parts of carcasses of cattle, sheep, swine, and goats, or the meat or meat products thereof which may be brought into any slaughtering, meat-canning, salting, packing, rendering, or similar establishment, and such examination and inspection shall be had before the said carcasses or parts thereof shall be allowed to enter into any department wherein the same are to be treated and prepared for meat food products; and the foregoing provisions shall also apply to all such products which, after having been

issued from any slaughtering, meat-canning, salting, packing, rendering, or similar establishment, shall be returned to the same or to any similar establishment where such inspection is maintained.

That for the purposes hereinbefore set forth the Secretary of Agriculture shall cause to be made by inspectors appointed for that purpose an examination and inspection of all meat food products prepared for interstate or foreign commerce in any slaughtering, meat-canning, salting, packing, rendering, or similar establishment, and for the purposes of any examination and inspection said inspectors shall have access at all times, by day or night, whether the establishment be operated or not, to every part of said establishment; and said inspectors shall mark, stamp, tag, or label as "Inspected and Passed" all such products found to be sound, healthful, and wholesome, and which contain no dies, chemicals, preservatives, or ingredients which render such meat or meat food products unsound, unhealthful, unwholesome, or unfit for human food; and said inspectors shall label, mark, stamp, or tag as "Inspected and Condemned" all such products found unsound, unhealthful, and unwholesome, or which contain dyes, chemicals, preservatives, or ingredients which render such meat or meat food products unsound, unhealthful, unwholesome, or unfit for human food, and all such condemned meat food products shall be destroyed for food purposes, as hereinbefore provided, and the Secretary of Agriculture may remove inspectors from any establishment which fails to so destroy such condemned meat food products: *Provided,* That, subject to the rules and regulations of the Secretary of Agriculture, the provisions hereof in regard to preservatives shall not apply to meat food products for export to any foreign country and which are prepared or packed according to the specifications or directions of the foreign purchaser, when no substance is used in the preparation or packing thereof in conflict with the laws of the foreign country to which said article is to be exported; but if said article shall be in fact sold or offered for sale for domestic use or consumption, then this proviso shall not exempt said article from the operation of all the other provisions of this act.

That when any meat or meat food prepared for interstate or foreign commerce which has been inspected as hereinbefore provided and marked "Inspected and Passed" shall be placed or packed in any can, pot, tin, canvas, or other receptacle or covering in any establishment where inspection under the provisions of this act is maintained, the person, firm, or corporation preparing said product shall cause a label to be attached to said can, pot, tin, canvas, or other receptacle or covering, under the supervision of an inspector, which label shall state that the contents thereof have been "Inspected and Passed" under the provisions of this act; and no inspection and examination of meat or meat food products deposited or inclosed in cans, tins, pots, canvas, or other receptacle or covering in any establishment where inspection under the provisions of this act is maintained shall be deemed to be complete until such meat or meat food products have been sealed or inclosed in said can, tin, pot, canvas, or other receptacle or covering under the supervision of an inspector,

and no such meat or meat food products shall be sold or offered for sale by any person, firm, or corporation in interstate or foreign commerce under any false or deceptive name; but established trade name or names which are usual to such products and which are not false and deceptive and which shall be approved by the Secretary of Agriculture are permitted.

The Secretary of Agriculture shall cause to be made, by experts in sanitation or by other competent inspectors, such inspection of all slaughtering, meat-canning, salting, packing, rendering, or similar establishments in which cattle, sheep, swine, and goats are slaughtered and the meat and meat food products thereof are prepared for interstate or foreign commerce as may be necessary to inform himself concerning the sanitary conditions of the same, and to prescribe the rules and regulations of sanitation under which such establishments shall be maintained; and where the sanitary conditions of any such establishments are such that the meat or meat food products are rendered unclean, unsound, unhealthful, unwholesome, or otherwise unfit for human food, he shall refuse to allow said meat or meat food products to be labeled, marked, stamped, or tagged as "Inspected and Passed."

That the Secretary of Agriculture shall cause an examination and inspection of all cattle, sheep, swine, and goats, and the food products thereof, slaughtered and prepared in the establishments hereinbefore described for the purposes of interstate or foreign commerce to be made during the nighttime as well as during the daytime when the slaughtering of said cattle, sheep, swine, and goats, or the preparation of said food products is conducted during the nighttime.

That on and after October first, nineteen hundred and six, no person, firm, or corporation shall transport or offer for transportation, and no carrier of interstate or foreign commerce shall transport or receive for transportation from one State or Territory or the District of Columbia, to any other State or Territory or the District of Columbia, or to any place under the jurisdiction of the United States, or to any foreign country, any carcasses or parts thereof, meat, or meat food products thereof which have not been inspected, examined, and marked as "Inspected and Passed," in accordance with the terms of this act and with the rules and regulations prescribed by the Secretary of Agriculture: *Provided*, That all meat and meat food products on hand on October first, nineteen hundred and six, at establishments where inspection has not been maintained, or which have been inspected under existing law, shall be examined and labeled under such rules and regulations as the Secretary of Agriculture shall prescribe, and then shall be allowed to be sold in interstate or foreign commerce.

That no person, firm, or corporation, or officer, agent, or employee thereof, shall forge, counterfeit, simulate, or falsely represent, or shall without proper authority use, fail to use, or detach, or shall knowingly or wrongfully alter, deface, or destroy, or fail to deface or destroy, any of the marks, stamps, tags, labels, or other identification devices provided for in this act, or in and as directed by the rules and regulations

prescribed hereunder by the Secretary of Agriculture, on any carcasses, parts of carcasses, or the food product, or containers thereof, subject to the provisions of this act, or any certificate in relation thereto, authorized or required by this act or by the said rules and regulations of the Secretary of Agriculture.

That the Secretary of Agriculture shall cause to be made a careful inspection of all cattle, sheep, swine, and goats intended and offered for export to foreign countries at such times and places, and in such manner as he may deem proper, to ascertain whether such cattle, sheep, swine, and goats are free from disease.

And for this purpose he may appoint inspectors who shall be authorized to give an official certificate clearly stating the condition in which such cattle, sheep, swine, and goats are found.

And no clearance shall be given to any vessel having on board cattle, sheep, swine, or goats for export to a foreign country until the owner or shipper of such cattle, sheep, swine, or goats has a certificate from the inspector herein authorized to be appointed, stating that the said cattle, sheep, swine, or goats are sound and healthy, or unless the Secretary of Agriculture shall have waived the requirements of such certificate for export to the particular country to which such cattle, sheep, swine, or goats are to be exported.

That the Secretary of Agriculture shall also cause to be made a careful inspection of the carcasses and parts thereof of all cattle, sheep, swine, and goats, the meat of which, fresh, salted, canned, corned, packed, cured, or otherwise prepared, is intended and offered for export to any foreign country, at such times and places and in such manner as he may deem proper.

And for this purpose he may appoint inspectors who shall be authorized to give an official certificate stating the condition in which said cattle, sheep, swine, or goats, and the meat thereof, are found.

And no clearance shall be given to any vessel having on board any fresh, salted, canned, corned, or packed beef, mutton, pork, or goat meat, being the meat of animals killed after the passage of this act, or except as hereinbefore provided for export to and sale in a foreign country from any port in the United States, until the owner or shipper thereof shall obtain from an inspector appointed under the provisions of this act a certificate that the said cattle, sheep, swine, and goats were sound and healthy at the time of inspection, and that their meat is sound and wholesome, unless the Secretary of Agriculture shall have waived the requirements of such certificate for the country to which said cattle, sheep, swine, and goats or meats are to be exported.

That the inspectors provided for herein shall be authorized to give official certificates of the sound and wholesome condition of the cattle, sheep, swine, and goats, their carcasses and products as herein described, and one copy of every certificate granted under the provisions of this act shall be filed in the Department of Agriculture, another copy shall be delivered to the owner or shipper, and when the cattle, sheep, swine, and goats or their carcasses and products are sent abroad, a third copy shall

be delivered to the chief officer of the vessel on which the shipment shall be made.

That no person, firm, or corporation engaged in the interstate commerce of meat or meat food products shall transport or offer for transportation, sell or offer to sell any such meat or meat food products in any State or Territory or in the District of Columbia or any place under the jurisdiction of the United States, other than in the State or Territory or in the District of Columbia or any place under the jurisdiction of the United States in which the slaughtering, packing, canning, rendering, or other similar establishments owned, leased, operated by said firm, person, or corporation is located unless and until said person, firm, or corporation shall have complied with all of the provisions of this act.

That any person, firm, or corporation, or any officer or agent of any such person, firm, or corporation, who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and shall be punished on conviction thereof by a fine of not exceeding ten thousand dollars or imprisonment for a period not more than two years, or by both such fine and imprisonment, in the discretion of the court.

That the Secretary of Agriculture shall appoint from time to time inspectors to make examination and inspection of all cattle, sheep, swine, and goats, the inspection of which is hereby provided for, and of all carcasses and parts thereof, and of all meats and meat food products thereof, and of the sanitary conditions of all establishments in which such meat and meat food products hereinbefore described are prepared; and said inspectors shall refuse to stamp, mark, tag, or label any carcass or any part thereof, or meat food product therefrom, prepared in any establishment hereinbefore mentioned, until the same shall have actually been inspected and found to be sound, healthful, wholesome, and fit for human food, and to contain no dyes, chemicals, preservatives, or ingredients which render such meat food product unsound, unhealthful, unwholesome, or unfit for human food; and to have been prepared under proper sanitary conditions, hereinbefore provided for; and shall perform such other duties as are provided by this act and by the rules and regulations to be prescribed by said Secretary of Agriculture; and said Secretary of Agriculture shall, from time to time, make such rules and regulations as are necessary for the efficient execution of the provisions of this act, and all inspections and examinations made under this act shall be such and made in such manner as described in the rules and regulations prescribed by said Secretary of Agriculture not inconsistent with the provisions of this act.

That any person, firm, or corporation, or any agent or employee of any person, firm, or corporation, who shall give, pay, or offer, directly or indirectly, to any inspector, deputy inspector, chief inspector, or any other officer or employee of the United States authorized to perform any of the duties prescribed by this act or by the rules and regulations of the Secretary of Agriculture any money or other thing of value, with intent to influence said inspector, deputy inspector, chief inspector, or other officer or employee of the United States in the discharge of any duty herein

provided for, shall be deemed guilty of a felony and, upon conviction thereof, shall be punished by a fine not less than five thousand dollars nor more than ten thousand dollars and by imprisonment not less than one year nor more than three years; and any inspector, deputy inspector, chief inspector, or other officer or employee of the United States authorized to perform any of the duties prescribed by this act who shall accept any money, gift, or other thing of value from any person, firm, or corporation, or officers, agents, or employees thereof, given with intent to influence his official action, or who shall receive or accept from any person, firm, or corporation engaged in interstate or foreign commerce any gift, money, or other thing of value given with any purpose or intent whatsoever, shall be deemed guilty of felony and shall, upon conviction thereof, be summarily discharged from office and shall be punished by a fine not less than one thousand dollars nor more than ten thousand dollars and by imprisonment not less than one year nor more than three years.

That the provisions of this act requiring inspection to be made by the Secretary of Agriculture shall not apply to animals slaughtered by any farmer on the farm and sold and transported as interstate or foreign commerce, nor to retail butchers and retail dealers in meat and meat food products, supplying their customers: *Provided,* That if any person shall sell or offer for sale or transportation for interstate or foreign commerce any meat or meat food products which are diseased, unsound, unhealthful, unwholesome, or otherwise unfit for human food, knowing that such meat food products are intended for human consumption, he shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding one thousand dollars or by imprisonment for a period of not exceeding one year, or by both such fine and imprisonment: *Provided, also,* That the Secretary of Agriculture is authorized to maintain the inspection in this act provided for at any slaughtering, meat canning, salting, packing, rendering, or similar establishment notwithstanding this exception, and that the persons operating the same may be retail butchers and retail dealers or farmers; and where the Secretary of Agriculture shall establish such inspection then the provisions of this act shall apply notwithstanding this exception.

That there is permanently appropriated, out of any money in the Treasury not otherwise appropriated, the sum of three million dollars, for the expenses of the inspection of cattle, sheep, swine, and goats and the meat and meat food products thereof which enter into interstate or foreign commerce and for all expenses necessary to carry into effect the provisions of this act relating to meat inspection, including rent and the employment of labor in Washington and elsewhere, for each year. And the Secretary of Agriculture shall, in his annual estimates made to Congress, submit a statement in detail, showing the number of persons employed in such inspections and the salary or per diem paid to each, together with the contingent expenses of such inspectors and where they have been and are employed.

Regulations Governing the Meat Inspection of the United States Department of Agriculture

REGULATION 1.—Scope of Inspection

SECTION 1. All slaughtering, packing, meat canning, salting, rendering, or similar establishments, except as hereinafter provided, the meat or meat food products of which, in whole or in part, enter into interstate or foreign commerce, shall have inspection under these regulations. The Secretary of Agriculture may exempt from inspection establishments operated by farmers, retail butchers, or retail dealers supplying their customers, but in the absence of such exemption inspection is required.

SECTION 2. Branch houses of official establishments, when such branch houses are engaged in interstate or foreign commerce and slaughter animals or process meat, shall be considered a part of the parent house, and products received into such branch houses or sent from them shall be subject to these regulations, and inspection shall be maintained therein.

REGULATION 2.—Organization of Force

SECTION 1. *Paragraph 1.* All permanent employees of the Department of Agriculture engaged in the work of meat inspection are appointed upon certification of the Civil Service Commission that they have passed the examination prescribed by that Commission. Promotions in all classes are made on the basis of efficiency, deportment, and length of service. Such employees include:

Paragraph 2. **Inspectors in Charge.**—These are inspectors assigned by the Bureau of Animal Industry to supervise official work at each official station. Such employees report directly to the Chief of the Bureau of Animal Industry and are chosen by reason of their fitness for responsibility as determined by their records in the service. At stations where slaughtering is conducted, only veterinary inspectors are placed in charge.

Paragraph 3. **Veterinary Inspectors.**—All applicants examined for these positions must be graduates of recognized veterinary colleges having a course of not less than three years leading to the degree. All final ante-mortem and post-mortem examinations are conducted by veterinarians. At some stations the veterinarians are assisted in making preliminary examinations by trained laymen known as inspectors' assistants.

Paragraph 4. **Traveling Veterinary Inspectors.**—To observe the conditions of sanitation of the establishments at the various stations, note the process of ante-mortem and post-mortem inspection, confer with and instruct inspectors regarding it, with a view to a uniform system throughout the country, and to report these matters to the Washington office, constitute the principal duties of these employees.

Paragraph 5. **Laboratory Inspectors.**—These employees possess technical training in microscopical and chemical examination of meat food products, and their inspections are conducted in laboratories located at various slaughtering centers. Pathological laboratories are also maintained, to which diseased specimens may be sent when necessary for diagnosis.

Paragraph 6. **Meat Inspectors.**—These employees are laymen, experienced in the curing, canning, packing, or otherwise preparing of meat; they supervise that work and the use of permitted preservatives described in Regulation 22.

Paragraph 7. **Traveling Meat Inspectors.**—These employees perform a service similar to that required of traveling veterinary inspectors, but along the line of the preparation and handling of meat products.

Paragraph 8. **Inspectors' Assistants.**—These employees are laymen, who are first assigned to routine duties and are promoted through examination to higher duties, such as assisting in conducting ante-mortem and post-mortem examinations.

Paragraph 9. **Patrolmen.**—Patrolmen are employed to patrol the establishments at night, to oversee the receipts and shipments of meat, and to observe any operations conducted at night. They consist of veterinarians, inspectors' assistants, or meat inspectors, according to the character of the work where assigned.

Paragraph 10. **Skilled Laborers.**—These employees supervise the marking of meat and meat containers, and perform similar work. They are eligible for promotion only through examination.

REGULATION 3.—Interpretation and Definition of Words and Terms

Wherever in these regulations the following words, names, or terms are used they shall be construed as follows:

SECTION 1. **Official Establishment.**—This term shall mean any slaughtering, meat-canning, salting, rendering, or similar establishment at which inspection is maintained under the meat-inspection law approved June 30, 1906 (34 Stat., 674).

SECTION 2. **Inspectors and Department Employees.**—These terms shall mean, respectively, inspectors and employees of the Bureau of Animal Industry.

SECTION 3. **"Inspected and Passed."**—This phrase, or any authorized abbreviation thereof, shall mean that the carcasses, parts of carcasses, meat, and meat food products so marked have been inspected and passed for food under these regulations.

SECTION 4. **Rendered into Lard or Tallow.**—This phrase shall mean that the carcasses, parts of carcasses, meat, and meat food products so designated are allowed to be made into edible lard or edible tallow.

SECTION 5. **"U. S. Inspected and Condemned."**—This phrase shall mean that the carcasses, parts of carcasses, meat, and meat food products so marked are unfit for food and shall be destroyed for food purposes.

SECTION 6. **Carcass.**—This word shall apply to the carcass of an animal that has been killed under these regulations and shall include all parts which are to be used for food.

SECTION 7. **Primal Parts of Carcasses.**—This phrase shall mean the usual sections or cuts of the dressed carcass commonly known in the trade, such as sides, quarters, shoulders, hams, backs, bellies, etc., and beef tongues, beef livers, and beef tails, before they have been cut, shredded, or otherwise subdivided preliminary to use in the manufacture of meat food products.

SECTION 8. **Meat Food Products.**—*Paragraph 1.* A meat food product, within the meaning of the meat-inspection act and of these regulations, is considered to be any article of food intended for human use which is derived or prepared in whole or in part from any edible portion of the carcass of cattle, sheep, swine, or goats, if the said edible portion so used is a considerable and definite portion of the finished food.

Paragraph 2. **Mixture.**—A mixture of which meat is an ingredient will not be considered a meat food product unless the meat contained therein is a definite and considerable portion of the said mixture. But where such mixture is prepared in a part of an official establishment, the sanitation of that part of the establishment will be supervised by the Department, and the meat or meat food product will be inspected before it enters the said mixture. The mixture shall not bear the meat-inspection legend or any simulation thereof. If any reference is made to Federal inspection it shall be in the following form: "The meat contained herein has been inspected and passed at an establishment where Federal inspection is maintained." Mixtures such as mince-meat, soups, etc., which come under this description and which are not officially labeled, are allowed in interstate and foreign commerce without further inspection, and without certificates, subject to the provisions and requirements of the Food and Drugs Act of June 30, 1906, and the regulations made thereunder.

SECTION 9. **Medical Meat Products.**—Products such as meat juice, meat extract, etc., which are intended only for medicinal purposes and are advertised only to the medical profession, are not considered meat food products within the meaning of this order.

SECTION 10. **Vinegar.**—The word vinegar, as used herein, shall mean cider vinegar, wine vinegar, malt vinegar, sugar vinegar, glucose vinegar, or spirit vinegar.

REGULATION 4.—Inspection or Exemption

SECTION 1. The proprietor or operator of each slaughtering, packing, meat-canning, rendering, or similar establishment engaged in the slaughtering of cattle, sheep, swine, or goats, or in the packing, canning, or other preparation of any meat food product for interstate or foreign commerce, shall make application to the Secretary of Agriculture for inspection or for exemption from inspection, except in cases where inspection or exemption is already in effect. In case of change in ownership

or change of location of an establishment already having inspection, a new application shall be made. Exemption under the law can be given only to establishments operated by retail butchers and retail dealers. Such application shall be in writing addressed to the Secretary of Agriculture, Washington, D. C., shall state the location of the establishment, and shall be made on blanks which will be furnished by the Chief of the Bureau of Animal Industry upon request.

SECTION 2. Inspection shall not be begun if an establishment is not in a sanitary condition, nor unless the establishment provides and guarantees to maintain adequate facilities for conducting such inspection.

SECTION 3. If in the judgment of the Secretary of Agriculture the retail butcher or retail dealer who is operating an establishment and engaged in supplying his customers through the medium of interstate or foreign commerce is entitled to exemption from Federal inspection, a numbered certificate of exemption will be furnished to the applicant for use with transportation companies and other companies and persons in securing the movement of his products. If an establishment, including both market and slaughterhouse of such retail butcher or dealer, is not in a sanitary condition a certificate of exemption will not be issued.

SECTION 4. Exempted establishments shall be open to the inspectors of the Bureau of Animal Industry, shall be maintained in a clean condition, and shall conform to the same regulations as govern official establishments in regard to labeling, dyes, chemicals, and preservatives, and unsound, unwholesome, and unfit meat.

REGULATION 5.—Official Number

SECTION 1. *Paragraph 1.* When inspection is established the Secretary of Agriculture will give the establishment a number, and this number shall be used to mark the meat and meat food products of the establishment as hereafter prescribed.

Paragraph 2. Two or more official establishments under the same ownership or control may use the same establishment number, provided a serial letter is added in each case to designate the establishment and to enable its product to be identified.

Paragraph 3. Persons, firms, or corporations owning subsidiary companies having legal entity may use the names of such companies, provided application has been made for inspection and it has been granted, the inspection legend in such case to bear the official establishment number of the parent firm or corporation.

Paragraph 4. Each official establishment must be separate and distinct from any other establishment or department in which animal products are handled at which inspection is not maintained. When two or more companies prepare their products in the same official establishment they must obtain inspection under the same number. The name of the distributor may appear upon the label.

REGULATION 6.—Assignment of Inspectors, Etc.

SECTION 1. The Chief of the Bureau of Animal Industry will designate an inspector to take charge of the inspection at each official establishment, and will assign to said inspector such assistants as may be necessary.

SECTION 2. For the purpose of enforcing the law and regulations all employees of the Bureau of Animal Industry shall have access at all times, by day or night, whether the establishment be operated or not, to every part of the establishment.

SECTION 3. Each employee of the Bureau of Animal Industry working under these regulations will be furnished with a numbered badge, which he shall wear over the left breast on the outer clothing while in the performance of his official duties, and which shall not be allowed to leave his possession. This official badge shall be sufficient identification to entitle him to admittance at all regular entrances and to all parts of the establishment and premises.

SECTION 4. Office room, including light and heat, shall be provided by proprietors of establishments, rent free, for the exclusive use, for official purposes, of the inspector and other employees of the Department assigned thereto. The room or rooms set apart for this purpose must be properly ventilated, conveniently located, and provided with lockers suitable for the protection and storage of such supplies as may be required; all to meet the approval of the inspector in charge.

REGULATION 7.—All Carcasses and Products Inspected

SECTION 1. All cattle, sheep, swine, or goats slaughtered at an official establishment, and all meat and meat food products prepared therein, shall be inspected, handled, prepared, and marked as required by these regulations.

REGULATION 8.—Notice of Daily Operations, Etc.

SECTION 1. The manager of each official establishment shall inform the inspector in charge, or his assistant, when work has been concluded for the day, and of the day and hour when work will be resumed. Under no circumstances shall any department of an establishment be operated except under the supervision of an employee of the Bureau of Animal Industry. All slaughtering of animals and the preparation of meat and meat food products shall be done within reasonable hours, and with reasonable speed, the facilities of the establishment being considered.

SECTION 2. Where one inspector is detailed to conduct the work at two or more small establishments where few animals are slaughtered or where but a small quantity of meat or meat food products is prepared, the inspector in charge may designate the hours for work.

SECTION 3. No work shall be performed at official establishments during any day on which such work is prohibited by the law of the State or

Territory in which the establishment is located. However, the Department will require that it be judicially determined that such work is prohibited by the State law.

REGULATION 9.—Bribery

SECTION 1. It is a felony, punishable by fine and imprisonment, for any person, firm, or corporation to give, pay, or offer, directly or indirectly, to any Department employee authorized to perform any duty under these regulations, any money or other thing of value with intent to influence said employee in the discharge of his duty under these regulations. It is also a felony, punishable by fine and imprisonment, for any Department employee engaged in the performance of duty under these regulations to receive or accept from any person, firm, or corporation engaged in interstate or foreign commerce any gift, money, or other thing of value given with any purpose or intent whatsoever.

REGULATION 10.—Sanitation

SECTION 1. After the receipt of an application for inspection or exemption an examination of the establishment and premises will be made and the requirements for sanitation and the necessary facilities for inspection will be specified.

SECTION 2. Plans and specifications, in duplicate, of plants for which application for inspection is made, also of new plants and plants to be remodeled, should be submitted to the Secretary of Agriculture.

SECTION 3. Official establishments and establishments to which certificates of exemption have been issued shall be suitably lighted and ventilated and maintained in a sanitary condition, and shall be provided with efficient drainage, having properly trapped or other approved sewer connections. Rooms in which inspection is carried on shall, by heating or other means, be kept reasonably free from steam and other vapors, in order that proper inspection can be made. All work in such establishments shall be performed in a cleanly and sanitary manner.

SECTION 4. Ceilings, walls, pillars, partitions, etc., shall be kept in a sanitary condition, and when necessary they shall be washed, scraped, painted or otherwise treated as required. Where floors or other parts of the building, or tables or other parts of the equipment, are so old or in such poor condition that they cannot be readily made sanitary they shall be removed and replaced by suitable materials. All floors upon which meats are piled during the process of curing shall be so constructed that they can be kept in a clean and sanitary condition, and all meat piled upon floors shall be suitably protected from trucks, etc. Walks and platforms or approaches leading into establishments shall be kept clean to prevent tracking dirt into the same.

SECTION 5. All trucks, trays, and other receptacles, all chutes, platforms, racks, tables, etc., and all knives, saws, cleavers, and other tools, and all utensils, machinery, and vehicles used in moving, handling, cut-

ting, chopping, mixing, canning, or other processes shall be thoroughly cleaned before using.

SECTION 6. Managers of establishments must require employees to be cleanly. The aprons, smocks, or other outer clothing worn by employees who handle meat or meat food products shall be of a material that is readily cleansed and made sanitary, and only clean garments shall be worn. Persons who handle meat or meat food products shall be required to keep their hands clean, and they shall be required also to pay particular attention to the cleanliness of their boots or shoes.

SECTION 7. Persons affected with tuberculosis or any other communicable disease shall not be employed in any of the departments of establishments where carcasses are dressed, meat is handled, or meat food products are prepared; and any employee of such establishment who may be suspected of being so affected shall be reported by the inspector in charge to the manager of the establishment and to the Chief of the Bureau of Animal Industry.

SECTION 8. All water-closets, toilet rooms, and dressing rooms shall be entirely separated from compartments in which carcasses are dressed or meat or meat food products are cured, stored, packed, handled, or prepared. Where such rooms open into compartments in which meat or meat food products are handled they must, when this is considered necessary, be provided with properly ventilated vestibules and with automatically closing doors. They shall be conveniently located, sufficient in number, ample in size, and fitted with modern lavatory accommodations, including toilet paper, soap, running hot and cold water, towels, etc. They shall be properly lighted, suitably ventilated, and kept in a sanitary condition. Convenient and sanitary urinals shall be provided; and washstands, near at hand, shall also be provided.

SECTION 9. The rooms or compartments in which meat or meat food products are prepared, cured, stored, packed, or otherwise handled shall be free from odors from toilet rooms, catch basins, casing departments, tank rooms, hide cellars, etc., and shall be kept free from flies and other vermin by screening, or other methods. All rooms or compartments shall be provided with cuspidors of such shape as not readily to be upset and of such material and construction as to be readily disinfected, and employees who expectorate shall be required to use them.

SECTION 10. The feeding of hogs or other animals on the refuse of slaughterhouses shall not be permitted on the premises of an exempted establishment or an official establishment, and no use incompatible with proper sanitation shall be made of any part of the premises on which such establishment is located. All yards, fences, pens, chutes, alleys, etc., belonging to the premises of such establishments, whether they are used or not, shall be maintained in a sanitary condition, and no nuisance shall be allowed in the establishment or on its premises.

SECTION 11. Butchers who dress or handle diseased carcasses or parts shall cleanse their hands of all grease and then immerse them in a prescribed disinfectant and rinse them in clear water before dressing or handling healthy carcasses. All butchers' implements used in dressing

diseased carcasses shall be sterilized either in boiling water or by immersion in a prescribed disinfectant, followed by rinsing in clear water. Facilities for such cleansing and disinfection, approved by the inspector in charge, shall be provided by the establishment. Separate sanitary trucks, etc., which shall be appropriately and distinctively marked, shall be furnished for handling diseased carcasses and parts. Following the slaughter of any animal affected with an infectious disease, a stop shall be made until the implements have been cleansed and disinfected, unless other clean implements are provided.

SECTION 12. Inspectors are required to furnish their own implements for use in dissecting, incising, or examining diseased carcasses or unsound parts, and are required to use the same means for disinfecting implements, hands, etc., that are prescribed for employees of the establishment.

SECTION 13. Due care must be taken to prevent meat and meat food products from falling on the floor; and in the event of their having so fallen, they must be condemned or the soiled portions removed and condemned. When meat or meat food products are being emptied into tanks, some device, such as a metal funnel, must be used.

SECTION 14. Carcasses shall not be inflated with air from the mouth, and no inflation of carcasses except by mechanical means shall be allowed. Carcasses shall not be dressed with skewers, knives, etc., that have been held in the mouth. Skewers shall be cleaned before being used again. Spitting on whetstones or steels when sharpening knives shall not be allowed.

SECTION 15. Only good, clean, and wholesome water and ice shall be used in the preparation of carcasses, parts, meat, or meat food products. Whenever there is any doubt regarding the sanitary condition of the water supply, notice shall be sent immediately to the Chief of the Bureau of Animal Industry.

SECTION 16. Wagons or cars in which meat or meat food products are transported shall be kept in a clean and sanitary condition. The wagons used in transporting loose meat between official establishments shall be so closed and covered that the contents shall be kept clean, and so constructed that they may, when necessary, be locked and sealed with Government seals, which seals shall be affixed and broken only by employees of the Department.

SECTION 17. Skins and hides from animals condemned for tuberculosis or any other disease infectious to man, but showing no outward appearance of disease, may be removed (except as provided in Regulation 13, section 2) for tanning or other uses in the arts when disinfected as follows: Each skin and hide must be immersed for not less than five minutes in a 5 per cent solution of liquor cresolis compositus, or a 5 per cent solution of carbolic acid, or a 1 to 1,000 solution of bichlorid of mercury. The process of skinning and dipping must be conducted entirely in the retaining room, or other specially prepared place, approved by the inspector in charge, for final inspection.

REGULATION 11.—Ante-mortem Examination and Inspection

SECTION 1. An ante-mortem examination and inspection shall be made of all cattle, sheep, swine, and goats about to be slaughtered before they shall be allowed to be killed in an official establishment. Satisfactory facilities for conducting said inspection and for separating and holding apart from passed animals those marked "U. S. Suspect" shall be provided.

SECTION 2. All animals showing symptoms or suspected of being affected with any disease or condition which, under these regulations, would probably cause their condemnation in whole or in part when slaughtered shall be marked by affixing to the animal a metal tag bearing the words "U. S. Suspect." All such animals, except as hereinafter provided, shall be set apart and slaughtered separately from other animals at an official establishment.

SECTION 3. Animals which have been tagged for pregnancy or for having recently given birth to young, and which have not been exposed to any infectious or contagious disease, and vaccine animals with unhealed lesions accompanied by fever and which have not been exposed to any other infectious or contagious disease, are not required to be slaughtered, but before any such animal is removed the tag shall be detached by a Department employee and returned with his report to the inspector in charge.

SECTION 4. If any pathological condition is suspected in which the question of temperature is important, such as Texas fever, anthrax, pneumonia, blackleg, or septicemia, the exact temperature should be taken. Due consideration, however, must be given to the fact that extremely high temperature may be found in otherwise normal hogs when subjected to exercise or excitement, and a similar condition may obtain to a less degree among other classes of animals.

SECTION 5. Animals commonly termed "downers," or crippled animals, shall be tagged before slaughter as provided for in Regulation 17, section 1, for the purpose of identification at the time of slaughter, and shall be passed upon in accordance with these regulations.

REGULATION 12.—Post-mortem Inspection at Time of Slaughter

SECTION 1. A careful inspection shall be made of all animals at the time of slaughter. The head, tongue, tail, thymus gland, and all viscera, and all parts and blood used in the preparation of meat food or medical products, shall be retained in such manner as to preserve their identity until after post-mortem examination has been completed, in order that they may be identified in case of condemnation of the carcass. Suitable racks or metal receptacles shall be provided for retaining such parts.

SECTION 2. Carcasses and parts thereof found to be sound, healthful, wholesome, and fit for human food shall be passed and marked as provided in these regulations.

SECTION 3. Should any lesion of disease or other condition that would render the meat or any organ unfit for food purposes be found on post-mortem examination, the carcass, part, or organ shall be marked immediately with a tag, as provided in Regulation 17, section 3. Carcasses which have been so marked shall not be washed or trimmed unless such washing or trimming is authorized by the inspector.

REGULATION 13.—Disposal of Diseased Carcasses and Organs

SECTION 1. The carcasses or parts of carcasses of all animals slaughtered at an official establishment and found at time of slaughter or at any subsequent inspection to be affected with any of the diseases or conditions named below shall be disposed of according to the section of this regulation pertaining to the disease or condition. It is to be understood, however, that owing to the fact that it is impracticable to formulate rules covering every case, and to designate at just what stage a process becomes loathsome or a disease noxious, the decision as to the disposal of all carcasses, parts, or organs not specifically covered by these regulations shall be left to the veterinary inspector in charge.

SECTION 2. All carcasses showing lesions of anthrax or charbon, regardless of the extent of the disease, and including the hide, hoofs, horns, viscera, fat, blood, and all other portions of the animal, shall be condemned and immediately incinerated. The killing bed upon which the animal was slaughtered shall be disinfected with a 10 per cent solution of formalin, and all knives, saws, cleavers, and other instruments which have come in contact with the carcass shall be treated as provided in Regulation 10, section 11, before being used upon another carcass.

SECTION 3. Carcasses of animals showing lesions of blackleg shall be condemned.

SECTION 4. Carcasses of animals affected with hemorrhagic septicemia shall be condemned.

SECTION 5. Carcasses showing lesions of pyemia or septicemia shall be condemned.

SECTION 6. Carcasses of vaccine animals mentioned under Regulation 11, section, 3, shall be condemned.

SECTION 7. Carcasses of animals which showed symptoms of rabies before slaughter shall be condemned.

SECTION 8. Carcasses of animals which showed symptoms of tetanus before slaughter shall be condemned.

SECTION 9. Carcasses of animals affected with malignant epizoötic catarrh and showing generalized inflammation of the mucous membranes shall be condemned.

SECTION 10. *Paragraph 1.* Carcasses showing well-marked and progressive lesions of hog cholera or swine plague in more than two of the organs (skin, kidneys, bones, or lymphatic glands) shall be condemned.

Paragraph 2. Provided they are well nourished, carcasses showing slight and limited lesions of these diseases may be passed.

Paragraph 3. Carcasses which reveal lesions more numerous or advanced than those for carcasses to be passed, but not so severe as the lesions described for carcasses to be condemned, may be rendered into lard, provided they are cooked by steam for four hours at a temperature not lower than 220 degrees Fahrenheit, or at a pressure of 4 pounds.

Paragraph 4. In inspecting carcasses showing lesions of hog cholera or swine plague in the skin, bones, kidneys, or lymphatic glands, due consideration shall be given to the extent and severity of the lesions found in the viscera.

SECTION 11. *Paragraph 1.* If a carcass affected with actinomycosis or lumpy jaw is in a well-nourished condition and there is no evidence upon post-mortem examination that the disease has extended from a primary area of infection in the head, the carcass may be passed, but the head including the tongue shall be condemned.

Paragraph 2. Carcasses of animals showing uncomplicated localized actinomycotic lesions other than, or in addition to, those specified in paragraph 1 of this section may be passed after the infected organs and parts have been removed and condemned.

Paragraph 3. Carcasses of animals showing a generalized actinomycosis shall be condemned.

SECTION 12. When the lesions of caseous lymphadenitis are limited to the superficial lymphatic glands or to a few nodules in an organ, involving also the adjacent lymphatic glands, and the carcass is well nourished, the meat may be passed after the affected parts are removed and condemned. If extensive lesions, with or without pleuritic adhesions, are found in the lungs, or if several of the visceral organs contain caseous nodules and the carcass is emaciated, it shall be condemned.

SECTION 13. *Paragraph 1.* The following principles are declared for guidance in passing on carcasses affected with tuberculosis:

Principle A.—The fundamental thought is that meat should not be used for food if it contains tubercle bacilli, if there is a reasonable possibility that it may contain tubercle bacilli, or if it is impregnated with toxic substances of tuberculosis or associated septic infections.

Principle B.—On the other hand, if the lesions are localized and not numerous, if there is no evidence of distribution of tubercle bacilli through the blood, or by other means, to the muscles or to parts that may be eaten with the muscles, and if the animal is well nourished and in good condition, there is no proof, or even reason to suspect, that the flesh is unwholesome.

Principle C.—Evidences of generalized tuberculosis are to be sought in such distribution and number of tuberculous lesions as can be explained only upon the supposition of the entrance of tubercle bacilli in considerable number into the systemic circulation. Significant of such generalization are the presence of numerous uniformly distributed tubercles throughout both lungs, also tubercles in the spleen, kidneys, bones, joints, and sexual glands, and in the lymphatic glands connected with these organs, and parts, or in the splenic, renal, prescapular,

popliteal, and inguinal glands, when several of these organs and parts are coincidentally affected.

Principle D.—By localized tuberculosis is understood tuberculosis limited to a single or several parts or organs of the body without evidence of recent invasion of numerous bacilli into the systemic circulation.

Paragraph 2. The following rules shall govern the disposal of tuberculous meat:

Rule A.—The entire carcass shall be condemned—

(*a*) When it was observed before the animal was killed that it was suffering with fever.

(*b*) When there is a tuberculous or other cachexia, as shown by anemia and emaciation.

(*c*) When the lesions of tuberculosis are generalized, as shown by their presence not only at the usual seats of primary infection, but also in parts of the carcass or the organs that may be reached by the bacilli of tuberculosis only when they are carried in the systemic circulation. Tuberculous lesions in any two of the following-mentioned organs are to be accepted as evidence of generalization when they occur in addition to local tuberculous lesions in the digestive or respiratory tracts, including the lymphatic glands connected therewith: Spleen, kidney, uterus, udder, ovary, testicle, adrenal gland, brain, or spinal cord or their membranes. Numerous uniformly distributed tubercles throughout both lungs also afford evidence of generalization.

(*d*) When the lesions of tuberculosis are found in the muscles or intermuscular tissue or bones or joints, or in the body lymphatic glands as a result of draining the muscles, bones, or joints.

(*e*) When the lesions are extensive in one or both body cavities.

(*f*) When the lesions are multiple, acute, and actively progressive. (Evidence of active progress consists in signs of acute inflammation about the lesions, or liquefaction necrosis, or the presence of young tubercles.)

Rule B.—An organ or a part of a carcass shall be condemned—

(*a*) When it contains lesions of tuberculosis.

(*b*) When the lesion is immediately adjacent to the flesh, as in the case of tuberculosis of the parietal pleura or peritoneum, not only the membrane or part affected but also the adjacent thoracic or abdominal wall is to be condemned.

(*c*) When it has been contaminated by tuberculous material, through contact with the floor, a soiled knife, or otherwise.

(*d*) All heads showing lesions of tuberculosis shall be condemned.

(*e*) An organ shall be condemned when the corresponding lymphatic gland is tuberculous.

Rule C.—The carcass, if the tuberculous lesions are limited to a single or several parts or organs of the body (except as noted in Rule A), without evidence of recent invasion of tubercle bacilli into the systemic circulation, shall be passed after the parts containing the localized lesions are removed and condemned in accordance with Rule B.

Rule D.—Carcasses which reveal lesions more numerous than those described for carcasses to be passed (Rule C), but not so severe as the lesions described for carcasses to be condemned (Rule A), may be rendered into lard or tallow if the distribution of the lesions is such that all parts containing tuberculous lesions can be removed. Such carcasses shall be cooked by steam at a temperature not lower than 220 degrees Fahrenheit for not less than four hours.

SECTION 14. Carcasses showing lesions to warrant the diagnosis of Texas fever shall be condemned.

SECTION 15. Carcasses of sheep affected with parasitic ictero-hematuria shall be condemned.

SECTION 16. Carcasses of animals affected with mange, or scab, in advanced stages, or showing emaciation or extension of the inflammation to the flesh, shall be condemned. When the disease is slight the carcass may be passed.

SECTION 17. *Paragraph 1.* Carcasses of animals affected with tapeworm cysts, known as *Cysticercus bovis* and *C. cellulosæ,* shall be rendered into lard or tallow, unless the infestation is excessive, in which case the carcass shall be condemned.

Paragraph 2. Carcasses of animals found infested with gid bladderworms (*Cœnurus cerebralis, Multiceps socialis*) may be passed after condemnation of the infected organ (brain, spinal cord).

Paragraph 3. Carcasses or parts of carcasses found infested with the hydatid cyst (echinococcus) may be passed after condemnation of the infected part or organ.

SECTION 18. All carcasses of animals so infected that consumption of the meat or meat food products thereof may give rise to meat poisoning shall be condemned. This section covers all carcasses showing signs of—

(*a*) Acute inflammation of the lungs, pleura, pericardium, peritoneum, or meninges.

(*b*) Septicemia or pyemia, whether puerperal, traumatic, or without any evident cause.

(*c*) Severe hemorrhagic or gangrenous enteritis or gastritis.

(*d*) Acute diffuse metritis or mammitis.

(*e*) Polyarthritis.

(*f*) Phlebitis of the umbilical veins.

(*g*) Traumatic pericarditis.

(*h*) Any other inflammation, abscess, or suppurating sore if associated with acute nephritis, fatty and degenerated liver, swollen soft spleen, marked pulmonary hyperemia, general swelling of lymphatic glands, and diffuse redness of the skin, either singly or in combination.

Immediately after slaughter of any animal so diseased the premises and implements used must be thoroughly disinfected as prescribed elsewhere in these regulations. The part of any carcass coming into contact with the carcass or any part of the carcass of any animal covered by this section, other than those affected with the diseases mentioned in (*a*) above, or with the place where such animal was slaughtered, or with the

implements used in the slaughter, before thorough disinfection of such place and implements has been accomplished, or with any other contaminated object, shall be condemned; in case the contaminated part is not removed from the carcass within two hours after such contact the whole carcass shall be condemned.

SECTION 19. Carcasses affected with icterus and showing an intense yellow or greenish yellow discoloration after proper cooling shall be condemned. Carcasses which exhibit a yellowish tinge directly after slaughter, but lose this discoloration on chilling, may be passed for food.

SECTION 20. Carcasses which give off the odor of urine or a strong sexual odor shall be condemned.

SECTION 21. Hogs affected with urticaria (diamond skin disease) *Tinea tonsurans, Demodex folliculorum,* or erythema may be passed after detaching and condemning the skin, if the carcass is otherwise fit for food.

SECTION 22. Carcasses of animals showing any disease, such as generalized melanosis, pseudo-leukemia, etc., which affects the system of the animal, shall be condemned.

SECTION 23. Any organ or part of a carcass which is badly bruised or which is affected by tumors, malignant or benign, abscesses, suppurating sores, or liver flukes shall be condemned; but when the lesions are so extensive as to affect the whole carcass, the whole carcass shall be condemned.

SECTION 24. Carcasses of animals too emaciated or anemic to produce wholesome meat, and carcasses which show a slimy degeneration of the fat or a serous infiltration of the muscles, shall be condemned.

SECTION 25. Carcasses of animals showing symptoms of milk fever or railroad sickness at the time of slaughter shall be condemned, as the flesh of such animals is frequently darker in color and more watery than is natural, and the present view of the pathology of at least the first disease suggests autointoxication.

SECTION 26. Carcasses of animals in advanced stages of pregnancy (showing signs of parturition), also carcasses of animals which have within ten days given birth to young and in which there is no evidence of septic infection, may be rendered into lard or tallow if desired by the manager of the establishment; otherwise they shall be condemned.

SECTION 27. Carcasses of animals too immature to produce wholesome meat, all unborn and stillborn animals, also carcasses of calves, pigs, kids, and lambs under three weeks of age, shall be condemned.

SECTION 28. In all cases where carcasses showing localized lesions of disease are passed or rendered into lard or tallow, the diseased parts must be removed before the "U. S. Retained" tag is taken from the carcass, and such parts shall be condemned.

SECTION 29. Hogs which have been allowed to pass into the scalding vat alive or have been suffocated in other ways shall be condemned.

SECTION 30. All animals that die in abattoir pens, and those in a dying condition before slaughter, shall be condemned and tagged as provided in Regulation 17, section 2. In conveying to the tank animals

which have died in the pens of the establishment, they shall not be allowed to pass through compartments in which food products are prepared. No dead animals shall be brought into an establishment for rendering from outside the premises of said establishment unless permission is first obtained from the Chief of the Bureau of Animal Industry.

SECTION 31. When a portion of a carcass is to be condemned on account of slight bruises, the bruised portion shall be removed immediately and tanked, and the remainder of the carcass shall be marked "Inspected and Passed." When desired, a retaining room may be provided in one part of the cooler for the retention of such carcasses until after they are chilled, when the bruised portion may be removed.

SECTION 32. Portions of intestines that show evidences of infestation with esophagostoma or other nodular affections shall be condemned.

SECTION 33. Hog carcasses found before evisceration has taken place to be affected with an infectious or contagious disease, including tuberculosis, shall not be eviscerated at the regular killing bed or bench, but shall be taken, separate from other carcasses, to the retaining room or other specially prepared place and there opened and examined.

REGULATION 14.—"Retaining" Rooms

SECTION 1. Separate compartments, to be known as "retaining rooms," or other special places for final inspection, shall be set apart at all official establishments, and all carcasses and parts marked with a "U. S. Retained" tag shall be held in these rooms pending final inspection. These rooms shall be rat proof, large enough for carcasses to hang separately, furnished with abundant light, and provided with sanitary tables and other necessary apparatus; the floors shall be of cement, asphalt, metal, or brick laid in cement, and shall have proper sewer connections. They shall be provided with facilities for locking, and locks for this purpose will be furnished by the Department. The keys to such locks shall remain in the custody of the inspector or his assistant. In establishments where it is impracticable or undesirable to have refrigeration in the retaining room, rooms may be constructed in the cooler for the reception and chilling of carcasses not affected with infectious diseases but which require further inspection.

SECTION 2. Retained carcasses shall be subjected to a final inspection, and immediately after this is completed those found to be wholesome and fit for human food shall be released by the veterinary inspector conducting the inspection, who shall remove the "U. S. Retained" tags, and the carcasses shall be removed from the retaining room and marked "Inspected and Passed," as provided in Regulation 17, section 5.

SECTION 3. The floors and walls of all retaining rooms shall be washed with hot water and disinfected after diseased animals are removed and before any "retained" carcasses are again placed therein.

REGULATION 15.—"Condemned" Rooms

SECTION 1. In each establishment at which condemned carcasses or meat food products are held until the day following their condemnation there shall be provided a room entirely separate from all other rooms in the establishment. This room shall be secure, rat proof, and shall be provided with a lock, the key of which shall remain in the custody of a Department employee. This room shall be known as the "condemned room," and shall be kept locked at all times except when condemned meat or meat food product is being taken into or from the said room under the supervision of a Department employee. The condemned room shall be kept clean.

SECTION 2. Carcasses or parts of carcasses found on final inspection to be unsound, unhealthful, unwholesome, or otherwise unfit for human food shall be marked "U. S. Inspected and Condemned," as provided in Regulation 17, section 4, and shall be immediately removed from the retaining room to the "condemned room," if such condemned room is provided. In case no condemned room is provided they shall be locked in the retaining room and shall be tanked at or before the close of the day on which they are condemned.

SECTION 3. Condemned carcasses shall not be allowed to accumulate, but shall be removed from the "condemned room," denatured as provided in Regulation 16, section 3, or tanked within a reasonable time after condemnation.

SECTION 4. A truck or trucks of sufficient capacity, plainly marked, and which can be locked or sealed, shall, when required by the inspector in charge, be provided for handling condemned meat.

REGULATION 16.—Tank Rooms, Tanks, and Tanking

SECTION 1. All tanks and equipment used for rendering and preparing edible product shall be in compartments separate from those used for rendering inedible product, and there shall be no connection by means of pipes or otherwise between the tanks or departments containing inedible product and those containing edible product. This provision must be complied with on or before October 1, 1908.

SECTION 2. *Paragraph 1.* All condemned carcasses, parts of carcasses, and meat food products shall be tanked as follows:

Paragraph 2. After the lower opening and the draw-off valves of the tank have been securely sealed by an employee of the Department and the condemned carcasses, parts, and meat food products are placed therein in his presence, the upper opening will be likewise securely sealed by such employee, whose duty it shall be then to see that a sufficient force of steam (not less than 40 pounds, producing a temperature of 288 degrees Fahrenheit) is turned into the tank and maintained a sufficient time (not less than six hours) effectually to render the contents unfit for any edible product. Wire and lead seals are provided by the

Department for sealing tanks. Proprietors of establishments are required to equip all tanks used for condemned products so that they may be securely sealed in the manner above specified.

Paragraph 3. A sufficient quantity of coloring matter or other substance to be designated by the Department shall be used in connection with the rendering of all condemned carcasses, parts of carcasses, meat, or meat food products to destroy them effectually for food purposes.

Paragraph 4. The seals of tanks containing condemned meat or the tankage thereof shall be broken only by an employee of the Department, and such employee shall supervise the drawing off of the contents of such tanks and the marking of the tallow and grease as inedible.

Paragraph 5. If an official establishment fails to permit the treatment and tanking of condemned carcasses, parts of carcasses, meat, or meat food products as required by these regulations, the inspector in charge shall report that fact to the Department, in order that inspection may be withdrawn from such establishment.

SECTION 3. Any meat or meat food products condemned at establishments which have no facilities for tanking shall be freely slashed with a knife and then denatured with crude carbolic acid or other prescribed agent, and then removed to an establishment indicated by the inspector in charge and there tanked and rendered under the supervision of an employee of the Department; or such meat or meat food products may be destroyed by incineration under the supervision of an employee of the Department.

REGULATION 17.—Tags, Brands, Stamps

SECTION 1. To each animal inspected under Regulation 11 which shows symptoms or is suspected of being affected with any disease or condition which under these regulations may cause its condemnation in whole or in part on post-mortem inspection there shall be affixed by a Department employee at the time of inspection a numbered metal tag bearing the words "U. S. Suspect," which shall remain upon the animal until final post-mortem inspection, when the carcass shall be marked according to the conditions found, and disposed of as elsewhere provided in these regulations.

SECTION 2. To the ear of each animal which is found in a dying condition or dead on the premises of an establishment there shall be affixed by a Department employee a numbered tag bearing the words "U. S. Condemned." The ear bearing the tag shall not be removed from the carcass. The number of this tag shall be reported to the inspector in charge by the employee who affixes it. This tag shall accompany the condemned carcass into the tank, and the Department employee who is supervising the tanking shall make a report of the number to the inspector in charge.

SECTION 3. Upon each carcass, or part or detached organ thereof, inspected under Regulation 12, in which any lesion of disease or other condition is found that might render the meat or any organ unfit for food

purposes, and which for that reason would require a subsequent inspection, there shall be placed by a Department employee at the time of inspection a tag, numbered in duplicate, bearing the words "U. S. Retained," and such other marks of identification shall be used as shall be approved by the Chief of the Bureau of Animal Industry. The inspector who attaches this "U. S. Retained" tag shall detach the numbered stub thereof and forward it with his report to the inspector in charge. The other portion shall accompany the carcass to the retaining room.

SECTION 4. Each carcass, or part or detached organ thereof, which is found on final inspection to be unsound, unhealthful, unwholesome, or otherwise unfit for human food, shall be marked conspicuously by a Department employee at the time of inspection with the words "U. S. Inspected and Condemned." The "U. S. Retained" tag shall accompany the carcass into the tank, and the number thereof shall be reported by the employee who supervises the tanking. If, however, upon final inspection the carcass or part thereof is passed, the "U. S. Retained" tag shall be removed and returned to the inspector in charge. A record of the tag showing the serial number, the final disposal of the carcass or part to which it was affixed, the date, and the name of the inspector shall be forwarded with the regular reports to the inspector in charge.

SECTION 5. Upon all passed carcasses slaughtered under inspection there shall be placed by an employee of the Department, or by an employee of the establishment under the supervision of an employee of the Department, meat-inspection marks bearing the words "Inspected and Passed," or an authorized abbreviation thereof, and such other matter as may be required by the Department. The number of marks, their location on the carcass, and the time they shall be affixed, shall be determined by the Chief of the Bureau of Animal Industry.

SECTION 6. *Paragraph 1.* Each passed primal part or the true container thereof must be marked under the supervision of a Department employee, with the words "Inspected and Passed," or an authorized abbreviation thereof, and the official establishment number, except as provided in paragraphs 2 and 3 of this section and in section 12 of Regulation 25.

Paragraph 2. When primal parts are shipped from one official establishment to another for further processing, it is not obligatory that the inspection legend appear on such primal parts, but the container thereof in the case of a package shall be marked as specified in section 9 of this regulation, and in the case of a car shall be sealed; in such cases the primal parts, after processing, shall show plainly the inspection legend and the number of the official establishment at which the processing was completed.

Paragraph 3. Passed primal parts of pork intended for export need not be marked with the authorized marks of inspection, but all outside containers shall bear the meat-inspection stamp.

SECTION 7. The inspection legend or an authorized abbreviation thereof may be affixed, under the supervision of a Department employee, to hams, bacon, and similar primal parts with a hot branding iron, and

when so affixed will be recognized as the official mark of inspection. When hot branding irons are used to affix trade brands or descriptions, such brand or description must be distinct and apart from the inspection legend.

SECTION 8. Upon all meat food products which are suspected on reinspection of being unsound, unhealthful, unwholesome, or otherwise unfit for human food, or upon the containers thereof, there shall be placed by a Department employee at the time of reinspection the "U. S. Retained" tags hereinbefore described. The employee who affixes the tag shall send the numbered stub with his report to the inspector in charge. These tags shall accompany the said meats or meat food products to the retaining room or other special place for final inspection. When the final inspection is made, if the meat or meat food product be condemned, the "U. S. Retained" tag shall be stamped "U. S. Inspected and Condemned," and shall accompany the condemned meat or meat food product to the tank, and the inspector shall report his action to the inspector in charge. If, however, upon final inspection the meat or meat food product is passed for food, the inspector shall stamp the retained tag "Inspected and Passed" and return the tag with his report to the inspector in charge.

SECTION 9. When meat products for domestic trade have been inspected and passed, the outside containers of such meat shall bear (in lieu of meat-inspection stamp) a domestic meat label which has been submitted to and approved by the Department, showing the official establishment number and the following legend: "The meat contained herein has been inspected and passed under the provisions of the act of June 30, 1906." The firm name may also appear on the label if desired. The dimensions of the label shall be not less than 4 inches by 2¾ inches. Outside containers, if bearing approved trade labels, are not required to be provided with the label above described. Domestic meat labels shall be affixed to packages in the manner prescribed in Regulation 24 for affixing labels to export packages.

SECTION 10. Each outside container (except cloth wrappings) of export meat or meat food products shall be marked with a meat-inspection stamp. The cloth wrappings of inspected and passed meat which is so marked shall be marked with an authorized mark of inspection.

SECTION 11. Upon each container of meat or meat food products, such as ham, bacon, etc., prepared for export with preservatives under Regulation 22, section 3, paragraph 1, there shall be placed, under the personal supervision of a Department employee, a special stamp for marking such meats, known as the "Preservative" stamp. All outside containers of such meat or meat food products shall bear the "Preservative" stamp.

REGULATION 18.—Trade Labels

SECTION 1. Upon each can, pot, tin, canvas, or other receptacle or covering containing any meat or meat food product, which meat or meat food product does not bear the marks "Inspected and Passed," there shall

be securely affixed, under the supervision of a Department employee, a trade label before such meat or meat food product leaves an official establishment. This trade label shall contain, in plain letters and figures of uniform size, the words "U. S. Inspected and Passed," the number of the official establishment at which the meat or meat food product is last processed, and the true name of the meat or meat food product contained in such package. The words "under the act of Congress of June 30, 1906," may be placed upon the label after the words "U .S. Inspected and Passed." An inspector shall not allow trade labels to be affixed until he is satisfied that the contents of the package are sound, healthful, wholesome, and fit for human food, in accordance with the statements on the label.

Section 2. Duplicate copies of each trade label in the form of sketches or proofs shall first be submitted to the Department, and no trade label shall be used until a sketch or proof thereof has been approved. After trade labels are printed from approved proofs or sketches they shall be forwarded in triplicate to the Department for approval and filing.

Section 3. No trade label bearing the words "U. S. Inspected and Passed," or any abbreviation or simulation thereof, shall be used on meat or meat food products which have not been inspected and passed under these regulations, and no trade label bearing the inspection legend, or any abbreviation or simulation thereof, shall be placed upon meat or meat food products except under the supervision of an inspector.

Section 4. Tin containers, embossed or lithographed with the label as prescribed in section 1, will be considered as bearing trade labels. On and after October 1, 1908, all sealed tin containers must have the number of the official establishment where packed, embossed, lithographed, or printed thereon.

Section 5. The essential features of a trade label are as follows, and shall appear upon each label:

The true name of the product.

The inspection legend.

The establishment number.

Section 6. The inspection legend "U. S. Inspected and Passed," or an authorized abbreviation thereof, and the official establishment number in plain characters of uniform size, which shall be in proper proportion to the general lettering of the label, must be separately and prominently embodied in all trade labels.

Section 7. In the case of meat contained in cartons, or in wrappers of paper, cloth, or other similar substance, the inspection legend and the official establishment number may be embodied in a sticker or seal of proportionate size prominently displayed with the trade label but not necessarily a part of the trade label, such stickers or seals to be approved by the Department of Agriculture. It is not permissible to affix to meat or meat food products a detachable device of any kind which bears the inspection legend.

SECTION 8. While labels to be affixed for foreign shipment may be printed in a foreign language, the same rules shall apply with reference to false labeling and the naming of ingredients as shall apply to goods prepared for domestic use. The inspection legend and the official establishment number must in all cases appear in English; but if desired they may, in addition, literally translated, appear in the language of the country to which the package is destined.

SECTION 9. *Paragraph 1.* When an article is prepared by an official establishment for another firm or individual, if the name of the said firm or individual is to appear upon the label the statement must be made that the article was "prepared for" or "manufactured for" the firm or individual. Names of subsidiary companies which have legal entity may be used without the prefix "prepared for" or "manufactured for."

Paragraph 2. When a firm or individual not operating under Federal inspection desires to reship inspected and passed meat that has been processed only under Government inspection and is eligible under these regulations for interstate shipment he may affix to the package the following statement: "The meat contained herein has been inspected and passed at an establishment where Federal inspection is maintained."

SECTION 10. No meat or meat food products shall be sold or offered for sale by any person, firm, or corporation under any false or deceptive name; but the established trade name or names which are usual to such products, which are not false and deceptive and which shall be approved by the Secretary of Agriculture, are permitted.

SECTION 11. No picture, design, or device which gives any false indication of origin or quality shall be used upon any label. The law prohibits any statement, design, or device false in any particular regarding the virtues or properties of the materials contained in the package.

SECTION 12. A meat food product when composed of more than one ingredient shall not bear a trade label with a name stating or purporting to show that the said meat food product is a substance which is not the principal ingredient contained therein, even though such name be an established trade name.

SECTION 13. A meat food product that contains a substance or substances, including water, added for the purpose of adulteration and which lessens its food value shall bear a label stating that such substance or substances have been added.

SECTION 14. When any weight is given upon the true container it must be the correct weight, and it must be stated whether this weight is the net weight or the gross weight.

REGULATION 19.—Reinspection

SECTION 1. Immediately before shipment, and at such other times as may be deemed necessary, all carcasses or parts thereof, whether fresh or cured, that have been previously inspected and passed, shall be reinspected by the inspector in charge or his assistants, in such manner as shall be prescribed by the Chief of the Bureau of Animal Industry, and

if upon any such reinspection any carcass or part thereof is found to have become unsound, unhealthful, unwholesome, or in any way unfit for human food the original mark, stamp, tag, or label shall be destroyed or defaced and the carcass or part shall be condemned.

SECTION 2. Except as provided in Regulation 20, only carcasses and parts thereof, meat, or meat food products which have not been processed except under Government supervision, and which can by marks, seals, brands, or labels be identified as having been previously inspected and passed by a Department employee, shall be taken into or allowed to enter an official establishment. All such carcasses, parts, meat, or meat food products which are brought into one official establishment from another, or which are returned to the establishment from which they issued, shall be identified and reinspected at the time of receipt, and shall be subject to further reinspection in such manner and at such times as may be deemed necessary. If upon any such reinspection any carcass or part thereof, or meat or meat food product, is found to have become unsound, unhealthful, unwholesome, or in any way unfit for human food, the original mark, stamp, tag, or label shall be defaced or destroyed, and the carcass, part, meat, or meat food product shall be condemned.

SECTION 3. Special docks and receiving rooms shall be designated by the establishment for the receipt and inspection of all meat or meat food products, and no meat or meat food products shall be allowed to enter the establishment except in the presence of a Department employee.

SECTION 4. Unrendered fats from carcasses which have been inspected and passed may be returned and received into official establishments, provided the fats have been handled in a sanitary manner after leaving the establishment, and provided further that upon inspection the fats are found to be clean, sweet, wholesome, and fit for human food. However, the return of such fats to official establishments and the manner in which they shall be handled from the time they leave such establishments until their return thereto shall be governed by such specific instructions as may be issued from time to time by the Chief of the Bureau of Animal Industry.

SECTION 5. Inedible fats may be received only into the tank room provided for inedible products, and when so received they shall not enter any compartment used for edible products.

SECTION 6. *Paragraph 1.* In order to provide for the interstate transportation, from public markets and other places, of portions of inspected and passed carcasses, parts, and meat food products which, when cut or otherwise removed from a marked carcass, part, or container, do not show the inspection mark and cannot therefore be identified as having been inspected and passed, market inspection may be furnished. Each city in which market inspection is established will be assigned a number, and all products forwarded under such inspection shall bear the inspection legend and the official number assigned to the city.

Paragraph 2. Unmarked portions which are cut from the marked carcass or part, or are removed from the marked container for interstate transportation, shall be marked by a Department employee. Wherever

practicable the brand shall be applied to the meat itself; where this cannot be done the true container of the meat or meat food product shall be marked as required by the Chief of the Bureau of Animal Industry.

Paragraph 3. All market stalls or other places which are given market inspection shall be maintained in a sanitary condition and shall also conform to the requirements of the Department governing the use of drugs, chemicals, dyes, and preservatives.

REGULATION 20.—Carcasses of Animals Not Inspected Ante Mortem

SECTION 1. Carcasses of animals which have had no ante-mortem inspection by inspectors of the Bureau of Animal Industry will not, except as hereinafter provided, be admitted into an official establishment. The exception to this rule applies only to carcasses to which the head and all viscera, except the stomach, bladder, and intestines, are held by the natural attachments. Such carcasses, if offered for admission into official establishments, shall be inspected, and if found to be free from disease and otherwise sound, healthful, wholesome, and fit for human food they shall be marked "Inspected and Passed" and admitted. If found to be diseased, unsound, unhealthful, unwholesome, or otherwise unfit for human food, they shall be marked "U. S. Inspected and Condemned," and the proprietor of the establishment shall be required to destroy them for food purposes, as provided in Regulation 16, section 2.

REGULATION 21.—Tank Cars

SECTION 1. Tank cars carrying edible meat food products into interstate or foreign commerce shall be provided with proper appliances for sealing and be securely sealed with seals furnished by the Department and affixed by Department employees.

SECTION 2. When such products for export are transferred from tank cars to other containers on boats, such transfer shall be under Government supervision, and the said containers on boats shall likewise be sealed.

REGULATION 22.—Dyes, Chemicals, and Preservatives

SECTION 1. No meat or meat food product shall contain any substance which lessens its wholesomeness, nor any drug, chemical, dye, or preservative, except as hereinafter provided.

SECTION 2. *Paragraph 1.* There may be added to meat or meat food products common salt, sugar, wood smoke, vinegar, pure spices, and saltpeter. Only such coloring matters as may be designated by the Secretary of Agriculture as being harmless may be used, and these only in such manner as the Secretary of Agriculture may designate.

Paragraph 2. Substances necessary for the preparation, clarification, or refining of meat food products will be permitted to be used subject to

the approval of the Secretary of Agriculture, provided they are eliminated from the meat food products during the further process of manufacture.

SECTION 3. *Paragraph 1.* In accordance with the written direction of the foreign purchaser or his agent, meat or meat food products prepared for export may contain preservatives of a kind and in proportions which do not conflict with the laws of the foreign country to which they are to be exported; but when such meat or meat food products are prepared for export under this regulation they shall be prepared in compartments of the establishment separate and apart from those in which meat or meat food products are prepared for the domestic trade, and such products shall be kept separate. Distinctive export certificates and stamps will be issued for meat or meat food products of this character, but, if the products are not exported, under no circumstances shall they be allowed to enter domestic trade.

Paragraph 2. The packing of meat which is prepared, as provided in paragraph 1 of this section, with any preservative not permitted by paragraph 1, section 2, may be done in the regular packing room, provided that no other meat is allowed in the packing room during the time of such packing. After such packing is completed the packing room shall be thoroughly cleansed of the preservative before the packing of other meat therein is resumed. A separate compartment constructed of tight partitions or walls shall be set apart for storing the preservative trays and other appliances used in connection with the packing. The Department will furnish a lock and key for this compartment, and the packing of all meat under this section shall be conducted under the personal supervision of an employee of this Department.

REGULATION 23.—Preparation of Meat and Meat Food Products

SECTION 1. All processes used in curing, pickling, rendering, canning, or otherwise preparing meat or meat food products in official establishments shall be supervised by Department employees. No fixtures or appliances, such as tables, trucks, trays, tanks, vats, machines, implements, cans, or containers of any kind shall be used unless they are clean and sanitary. All steps in the process of manufacture shall be conducted carefully and with strict cleanliness. All salt, pickling fluids, and other solutions or substances used in curing meat must be clean.

SECTION 2. Canned meat or meat food products which require sterilization to preserve them must be subjected to this process on the same day that the cans are filled. Defective or leaking cans discovered after the process of sterilization has been completed shall not be repaired or repacked (unless such repairing or repacking is done within six hours of the time of original sterilization), but the contents of such cans shall be removed and condemned.

SECTION 3. Potato flour shall not be used in the preparation of sausage, nor shall excessive quantities of cereals or water be used.

SECTION 4. *Paragraph 1.* The manufacture of all fats into lard, tallow, oils, and stearin at official establishments shall be closely super-

vised by employees of the Department, who shall see that all portions of carcasses rendered into edible products are clean and wholesome.

Paragraph 2. Heads rendered into edible product shall first be split, cross sectioned, and thoroughly washed and cleaned.

Paragraph 3. When hogs' feet are used for lard, the hair, hoofs, and tissues of the interdigital spaces must be removed.

Paragraph 4. All pipes and similar conveyors used in conducting edible fats from one receptacle or container to another shall be of a distinctly different color from the pipes and similar conveyors used in conducting inedible fats from one receptacle or container to another.

Paragraph 5. Blue prints or other accurate diagrams showing all underground pipe lines or other conveyors used to conduct edible and inedible products at official establishments and also those extending from official establishments to other establishments, either official or unofficial, with a description giving the exact location, terminals, and dimensions of such pipes, or other conveyors, and of all gates, valves, or other controlling apparatus, shall be filed with the Department, and a copy of such prints or diagrams shall be filed with the inspector in charge. The prints or diagrams should designate the lines used for conveying edible products and those used for conveying inedible products. If no such underground pipes or conveyors are used for the purposes above indicated, a written statement certifying to this fact and duly signed by the management of each establishment shall be filed with the Department.

Paragraph 6. All containers, such as vats and tierces, in which white grease or other inedible meat products are placed, shall be plainly marked "inedible" in such a manner that they can be readily identified.

Paragraph 7. Final containers, such as tierces, shall be appropriately marked on both ends immediately after filling.

SECTION 5. The only animal casings that may be used as containers in the manufacture of sausage under these regulations are those from cattle, hogs, sheep, or goats.

REGULATION 24.—Stamps for Export Packages

SECTION 1. *Paragraph 1.* Numbered meat-inspection stamps shall be affixed to packages (except those in cloth wrappings) containing meat or meat food products to be shipped or otherwise transported in foreign trade.

Paragraph 2. Stamps shall be affixed in the following manner, and when they have been affixed they shall be covered immediately with a coating of transparent varnish or other similar substance:

(*a*) The stamp may be affixed in a grooved space made by removing a portion of the wood of sufficient size to admit the stamp.

(*b*) The stamp may be placed on either end of the package, provided that the sides are made to project at least one-eighth of an inch to afford the necessary protection from abrasion.

SECTION 2. Inedible-product stamps and certificates may, upon request, be issued to accompany shipments for export of casings, bladders, bungs, hoofs, and other similar inedible animal products.

REGULATION 25.—Transportation [a]

SECTION 1. Upon the application of the exporter the inspector in charge of an establishment is authorized to issue certificates for export shipments of inspected and passed meat or meat food products. The certificate should be issued at the time the product leaves the establishment; if, however, the certificate is not issued at that time, it can only be issued upon identification and reinspection of the product.

SECTION 2. These certificates shall be issued in serial numbers and in triplicate form. Each certificate shall show the names of the exporter, and the consignee, the destination, the numbers of the stamps attached to the article to be exported, the shipping marks, the kind of product, and the weight.

SECTION 3. Only one certificate shall be issued for each consignment unless otherwise directed by the Chief of the Bureau of Animal Industry.

SECTION 4. Both the original and duplicate certificates shall be delivered by the inspector to the shipper. The copy of certificate provided by law to be delivered to the chief officer of the vessel shall be the duplicate copy and shall be filed with the customs officers at the time of filing the master's manifest or the supplemental manifest.

SECTION 5. No master of any steam or sailing vessel shall receive for transportation or transport from the United States to Great Britain or Ireland, or any of the countries of continental Europe, or to Argentina or Mexico, any carcass, part of carcass, or meat food product of cattle, sheep, swine, or goats, except ship stores, unless and until a certificate of inspection covering the same has been issued and delivered as provided in this regulation. The requirement of export certificates is waived for meat and meat food products to foreign countries other than those hereinbefore named.

SECTION 6. When inedible grease, inedible tallow, or inedible stearin derived from cattle, sheep, swine, or goats is offered for export, the collectors of customs, under instructions from the Secretary of Commerce and Labor, will require an affidavit from the exporter that the products to be exported are inedible and are not intended for food purposes.

SECTION 7.*a* No person, firm, or corporation shall receive for transportation or transport from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia any carcass, part of carcass, or meat food product of cattle, sheep, swine, or goats unless and until a certificate is made and furnished in one of the forms prescribed in sections 11, 12, 13, and 14 of this regulation, showing that such meat or meat food product has been either inspected and passed or exempted from inspection, according to act of Congress of June 30, 1906: *Provided,* That printed certificates in the forms formerly required and now on hand may be used for this purpose. It is necessary, as old stocks of printed certificates are exhausted, that new ones be printed in the new forms.

SECTION 8.*a* When any shipment of meat or meat food products covered by these regulations is offered to any common carrier for carriage

within the United States as a part of a foreign movement, the same certificate shall be required as if the shipment was destined to a point within the United States.

SECTION 9.*a* *Paragraph 1.* Shipments of inspected and passed meat or meat food products that are so marked may be diverted from the original destination without a reinspection of the product, if a new certificate showing the changed destination be given to the carrier by the owner or shipper, who may or may not be the original shipper; or in case of a wreck or other extraordinary emergency the carrier may divert such shipments from the original destination without a new shippers' certificate.

Paragraph 2. The Government seals on a car containing inspected and passed meat or meat food products may be broken by the carrier in case of wreck or other extraordinary emergency, and if necessary the product may be reloaded into another car or the shipment may be diverted from the original destination without another shipper's certificate; but in all such cases the carrier shall immediately report the transaction by telegraph to the Chief of the Bureau of Animal Industry, Washington, D. C. Such report shall include the information indicated below:

(*a*) Nature of the emergency.
(*b*) Place where seals were broken.
(*c*) Original points of shipment and destination.
(*d*) Number and initials of the original car.
(*e*) Number and initials of the car into which the product is reloaded.
(*f*) New destination of the shipment.
(*g*) Kind and amount of product.

SECTION 10.*a* Reshipments of inspected meat or meat food products which are sound and wholesome at the time of reshipment may be made without reinspection when the meat or meat food products, or the containers thereof, are marked "Inspected and Passed," and the meat or meat food products have not been processed since they were originally shipped under section 11 of this regulation. Also jobbers, wholesalers, or others who do no processing, and who receive "Inspected and Passed" meat or meat food products, may break bulk, repack, and reship the same into interstate commerce under section 11 of this regulation, if each piece of meat or meat food product in the unmarked package bears the original authorized mark of Government inspection. Inspection shall be maintained at the establishments of all such jobbers, wholesalers, or others who do any processing.

SECTION 11.*a* When any carcass, part of carcass, or meat food product of cattle, sheep, swine, or goats which has been inspected and passed and so marked under these regulations is offered to any common carrier for transportation from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia for interstate shipment only, or for interstate shipment as part of a foreign movement, or for foreign shipment, the person, firm, or corporation offering such carcass, part of carcass, or meat food product shall make a certificate in

the following form and deliver the same to the said common carrier, except as provided in section 12 of this regulation.

Date.....191....

Name of common carrier .....
Shipper .....
Point of shipment .....
Consignee .....
Destination .....

I hereby certify that the meat or meat food products described herein, which are offered for shipment in interstate or foreign commerce, have been inspected and passed according to act of Congress of June 30, 1906, are so marked, and at this date are sound, healthful, wholesome, and fit for human food.

Kind of Product.	Amount and weight.
.....	.....
.....	.....
.....	.....
	.....

(Signature of shipper.)

.....
(Address of shipper.)

This certificate may be stamped upon or incorporated in any form which is regularly or ordinarily used in the shipment of meat or meat food products.

SECTION 12.*b* *Paragraph 1.* An official establishment may ship from the said establishment to any other official establishment any meat or meat food product which has been inspected and passed under these regulations without marking the same "Inspected and Passed," if such shipment be placed in a railroad car which is sealed by an employee of the Bureau of Animal Industry, and provided that not less than 25 per cent of the contents of each car consists of meat or meat food products not marked "Inspected and Passed."

Paragraph 2. Wagons so equipped that they can be securely sealed by a Department employee may be considered as true containers.

Paragraph 3. When shipments are made under paragraph 1 of this section the shipper shall make for each car and deliver to the common carrier in duplicate a certificate in the following form:

Date.....191....

Name of common carrier .....
Establishment number of consignor .....
Point of shipment .....
Establishment number of consignee .....
Destination .....
Car number and initials .....

I hereby certify that the following-described meat or meat-food products have been inspected and passed according to act of Congress of June 30, 1906. They are not marked "Inspected and Passed," but have been placed in the above car under the supervision of an employee of the Bureau of Animal Industry which was sealed by him with Government seals Nos. ..... and .....

Kind of Product.	Amount and weight.
.....	.....
.....	.....
.....	.....
	.....

(Signature of shipper.)

.....
(Address of shipper.)

The duplicate certificate shall be forwarded immediately by the initial carrier to the Chief of the Bureau of Animal Industry, Washington, D. C. Attention is directed to the law which provides a penalty of fine and imprisonment for any unauthorized person who breaks a seal on such cars.

When shipments are made under this section the inspector in charge at point of origin shall duly notify the Chief of the Bureau of Animal Industry and the inspector in charge at point of destination.

SECTION 13.*a* When any carcass, part of carcass, or meat food product of cattle, sheep, swine, or goats which has not been inspected under these regulations is offered for shipment from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia by any retail butcher or retail dealer who holds a certificate of exemption issued by the Secretary of Agriculture, the common carrier shall require a certificate to be made in duplicate in the following form by said retail butcher or retail dealer, which certificate shall in all cases show the exemption number designated by the Secretary of Agriculture for said retail butcher or retail dealer:

Date.....191....

Name of common carrier .....
Shipper .....
Point of shipment .....
Consignee .....
Destination .....
Number of exemption certificate .....

I hereby certify that I am a retail butcher or a retail dealer in meat or meat food products; that the following-described meat or meat food products are offered for shipment in interstate commerce to a customer, as exempted from inspection according to act of Congress of June 30, 1906, under certificate issued to me by the United States Department of Agriculture, and that at this date they are sound, healthful, wholesome, and fit for human food, and contain no preservative or coloring matter or other substance prohibited by the regulations of the Secretary of Agriculture governing meat inspection.

Kind of Product.	Amount and weight.
.....	.....
.....	.....
.....	.....
	.....

(Signature of shipper.)

.....

(Address of shipper.)

The duplicate certificate shall be forwarded immediately by the initial carrier to the Chief of the Bureau of Animal Industry, Washington, D. C. This certificate shall be separate and apart from any waybill, bill of lading, or other form ordinarily used in the shipment of meat.

SECTION 14.*a* When any cattle, sheep, swine, or goats have been slaughtered by any farmer on the farm, and the carcasses, parts of carcasses, or meat food products thereof are offered to any common carrier for transportation from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia, the common carrier may so transport such carcasses, parts of carcasses, or meat

food products as long as the same may be identified as of animals slaughtered by any farmer on the farm.

The common carrier shall require a certificate in duplicate in the following form:

Date.....191....

Name of common carrier .....
Shipper .....
Consignee .....
Point of shipment .....
Destination .....

I hereby certify that the following-described uninspected meat or meat food products are from animals slaughtered by a farmer on the farm, and are offered for transportation in interstate commerce as exempted from inspection according to act of Congress of June 30, 1906, and that at this date they are sound, healthful, wholesome, and fit for human food, and contain no preservative or coloring matter or other substance prohibited by the regulations of the Secretary of Agriculture governing meat inspection.

Kind of Product.	Amount and weight.
.....	.....
.....	.....
.....	.....
	.....

(Signature of shipper.)

.....

(Address of shipper.)

The duplicate certificate shall be forwarded immediately by the initial carrier to the Chief of the Bureau of Animal Industry, Washington, D. C.

SECTION 15.*b*. All original certificates delivered to the common carrier, as required by this regulation, shall be filed and retained for one year by the initial carrier, in order that they may be readily checked by this Department in such manner as the Secretary of Agriculture may from time to time prescribe.*a*

SECTION 16.*b* All waybills, transfer bills, running slips, or conductor's cards accompanying an interstate or foreign shipment of meat or meat food product must have embodied in, stamped upon, or attached to it a signed statement which shall be evidence to connecting carriers that the proper shipper's certificate as required by sections 11, 12, 13, and 14 of this regulation is on file with the initial carrier, and no connecting carrier shall receive for transportation or transport any interstate or foreign shipment of meat or meat food product unless the waybill, transfer bill, running slip, or conductor's card accompanying the same includes the aforesaid signed statement in one of the following forms:

When shipment is made under section 11 or 12:

(Name of transportation company.)

United States inspected and passed as evidenced by shipper's certificate on file with initial carrier.

(Signed) .....*Agent.*

When shipment is made under section 13 or 14:

(Name of transportation company.)

Exempted from inspection as evidenced by shipper's certificate on file with initial carrier.

(Signed) .....*Agent.*

SECTION 17.*c* *Paragraph 1.* When any carcass, part of carcass, or meat food product of cattle, sheep, swine, or goats loaded on a truck, wagon, cart, or other vehicle, or otherwise prepared for shipment, is offered for transportation or transported by ferry, such ferry being the initial carrier from one State, Territory, or the District of Columbia to another State, Territory, or the District of Columbia, the person, firm, or corporation offering such carcass, part of carcass, or meat food product shall, except as hereinafter provided by paragraph 5, make a certificate in one of the forms hereinafter indicated and deliver the certificate to said common carrier; and no person, firm, or corporation operating a ferry line as aforesaid shall receive for transportation or transport any carcass, part of carcass, or meat food product of cattle, sheep, swine, or goats loaded on a truck, wagon, cart, or other vehicle, or in any other manner prepared for transportation, unless a certificate in one of the forms referred to is properly filled out and delivered by the shipper as herein required.

Paragraph 2. When the shipment consists of inspected and passed meat or meat food products, the form of certificate shown in section 11 of this regulation shall be used.

Paragraph 3. When the shipment is made under exemption and consists of meat or meat food product which has not been inspected and passed, the form of certificate shown in section 13 of this regulation shall be used, and a duplicate shall be forwarded immediately by the ferry company to the Chief of the Bureau of Animal Industry, Washington, D. C.

Paragraph 4. When the shipment consists of meat or meat food products from animals slaughtered by a farmer on the farm and which have not been inspected and passed, the form of certificate shown in section 14 of this regulation shall be used, and a duplicate shall be forwarded immediately by the ferry company to the Chief of the Bureau of Animal Industry, Washington, D. C.

Paragraph 5. When a shipper's certificate for meat or meat food products has been issued and is on file with the initial carrier and that fact is shown by notation on the billing, the ferry company need not require another certificate.

SECTION 18.*a* Imported meat or meat food products which have not been mixed or compounded with or added to domestic meat or meat food products may be transported by any common carrier from one State or Territory or the District of Columbia into another State or Territory or the District of Columbia if the packages containing them are marked "Inspected under the Food and Drugs Act of June 30, 1906," when received for transportation.

SECTION 19.*b* *Paragraph 1.* Meat or meat food products which have been inspected and passed and so marked, and which have been transported from the establishments in which they were prepared into the channels of trade, and which are alleged or known to have become unsound, unwholesome, or otherwise unfit for human food, may be transported in interstate commerce only under the following restrictions:

Paragraph 2. Meat or meat food products inspected and passed and so marked and which are alleged to be unsound, unwholesome, or otherwise unfit for human food may be shipped from one State or Territory or the District of Columbia to any official establishment in the same or a different State or Territory if a written permit in duplicate for such shipment be first obtained from the inspector in charge of the establishment to which the shipment is destined. In all such shipments both the original and duplicate copies of the permits shall be surrendered to the carrier accepting the meat or meat food product, and the carrier shall require the shipper to furnish three copies of the form of certificate hereinafter given. One of these certificates and the duplicate copy of the permit shall be retained by the carrier; another copy of the certificate, together with the original permit, shall be mailed by the carrier to the Chief of the Bureau of Animal Industry, Washington, D. C., and the third copy of the certificate shall be addressed and mailed by the carrier to the Bureau of Animal Industry inspector in charge at the point to which the shipment is consigned. Upon the arrival of the shipment at the establishment the inspector in charge shall cause a careful inspection to be made of the shipment, to determine whether or not it is unsound, unwholesome, or otherwise unfit for food. Should the meat or meat food product contained in the shipment prove to be unsound, unwholesome, or otherwise unfit for human food, it shall at once be stamped "U. S. Inspected and Condemned" and be immediately tanked or removed to the condemned room. If the meat or meat food product contained in the shipment shall prove to be sound, wholesome, and fit for human food, the inspector shall allow the meat or meat food product to enter the establishment. Meat or meat food products at an official establishment alleged or known to be unsound, unwholesome, or otherwise unfit for human food shall not be shipped under this paragraph, but must be disposed of at the establishment.

Paragraph 3. Meat or meat food products which have been inspected and passed and are so marked and are alleged to be unsound, unwholesome, or otherwise unfit for human food may be returned from one State or Territory or the District of Columbia to any jobber, wholesaler, or other dealer from whom the said meat or meat food product was purchased, if a written permit, in duplicate, for such shipment be first obtained from the Chief of the Bureau of Animal Industry. In all such shipments both the original and duplicate copies of the permits shall be surrendered to the carrier accepting the meat or meat food product, and the carrier shall require the shipper to furnish two copies of the form of certificate hereinafter given. One of these certificates and the duplicate copy of the permit shall be retained by the carrier, and the other copy of the certificate, together with the original permit, shall be mailed by the carrier to the Chief of the Bureau of Animal Industry, Washington, D. C. If the meat or meat food product which is shipped under this section shall prove to be unsound, unwholesome, or otherwise unfit for human food it may not be reshipped in interstate commerce as a food product.

Paragraph 4. The shipper's certificate required by paragraphs 2 and 3 of this section shall be in the following form, and shall in all cases show a description and the weight of the meat or meat food product: *a*

Date.....191....

Name of common carrier .....
Consignor .....
Point of shipment .....
Consignee .....
Destination .....
Number of permit .....

I hereby certify that the following-described meat or meat food products have been inspected and passed according to the act of Congress of June 30, 1906, and are so marked. It is alleged that the said meat or meat food products are unsound, unhealthful, unwholesome, and unfit for human food.

Kind of Product.	Amount and weight.
.....	.....
.....	.....
.....	.....

.....
(Signature of shipper.)
.....
(Business or occupation of shipper.)
.....
(Address of shipper.)

As evidence to connecting carriers that the proper shipper's certificate as required by this paragraph is on file with the initial carrier, the way-bills, transfer bills, running slips, or conductors' cards accompanying the shipments of meat or meat food products, made under paragraphs 2 and 3 of this section, must have embodied in, stamped upon, or attached to the same a signed statement in the following form:

(Name of railroad company.)

Meat or meat product alleged to be unsound, unwholesome, or otherwise unfit for food, as evidenced by shipper's certificate on file with initial carrier.

(Signed) .....*Agent.*

Paragraph 5. Uninspected meat or meat food product, or meat or meat food product inspected and marked and which is known to have become unsound, unwholesome, or otherwise unfit for human food, or inedible grease or tallow or other fat, may be shipped from one State or Territory or the District of Columbia to another State or Territory or the District of Columbia or to a foreign country for industrial purposes. No such shipment shall be accepted by any carrier unless and until the product which is known to be unsound, unwholesome, or otherwise unfit for food shall have been denatured or otherwise rendered unavailable for food purposes. The carrier shall require the shipper to certify in writing that the meat or meat food product has been so denatured or otherwise rendered unavailable for food purposes. This certificate of the shipper that the meat or meat food product has been denatured shall be forwarded by the carrier to the Chief of the Bureau of Animal Industry, Washington, D. C. It is suggested that the shipper's certificate of de-

naturing required for shipments made under this paragraph be in the following form:

Date.....191....

Name of common carrier .....
Consignor .....
Point of shipment .....
Consignee .....
Destination .....

I hereby certify that the following-described inedible meat or meat food products have been denatured or otherwise rendered unavailable for food purposes.

Kind of Product.	Amount and weight.
.....	.....
.....	.....
.....	.....
	.....

(Signature of shipper.)

.....

(Business or occupation of shipper.)

.....

(Address of shipper.)

As evidence to connecting carriers that the proper shipper's certificate is on file with the initial carrier, the waybills, transfer bills, running slips, or conductors' cards accompanying the shipment of meat or meat food product under this paragraph must have embodied in, stamped upon, or attached to the same a signed statement in the following form:

(Name of railroad company.)

Unsound, unwholesome, or otherwise unfit for food, and denatured or otherwise rendered unavailable for food purposes, as evidenced by shipper's certificate on file with the initial carrier.

(Signed) .....*Agent.*

REGULATION 26.—Counterfeiting, Etc.

SECTION 1. It is a misdemeanor, punishable by fine and imprisonment, for any person, firm, or corporation, or officer, agent, or employee thereof, to forge, counterfeit, simulate, or falsely represent, or without proper authority to use, fail to use, or detach, or knowingly or wrongfully to alter, deface, or destroy, or to fail to deface or destroy, any of the marks, stamps, tags, labels, or other identification devices provided for by law, or by these regulations, on any carcasses, parts of carcasses, or the food product, or the containers thereof, or wrongfully to use, deface, or destroy any certificate provided for by law or by these regulations.

REGULATION 27.—Reports

SECTION 1. Reports of the work of inspection carried on in every official establishment shall be forwarded to the Department by the inspector in charge, on such blank forms and in such manner as may be specified by the Chief of the Bureau of Animal Industry.

SECTION 2. The proprietors of official establishments shall furnish daily to the Department employees detailed to the various departments accurate information regarding receipts, shipments, and amounts of products on which to base their daily reports.

SECTION 3. Reports on sanitation shall be made at stated times by the Department employees in charge of the various departments to the inspector in charge of the station, and by the inspector in charge to the Chief of the Bureau of Animal Industry. If any insanitary conditions are detected by any Department employee, such conditions shall be reported immediately to the inspector in charge, who, after investigation, shall report them to the Chief of the Bureau.

REGULATION 28.—Appeals

SECTION 1. When the action of any inspector in condemning any carcass or part thereof, meat, or meat food product is questioned, appeal may be made to the inspector in charge, and from his decision appeal may be made to the Chief of the Bureau of Animal Industry or to the Secretary of Agriculture, whose decision shall be final.

REGULATION 29.—Cooperation with Municipal Authorities

SECTION 1. Inspectors in charge are directed to notify the municipal authorities of the character of inspection, and upon request to advise with such authorities with a view to preventing the entry into the local markets of diseased animals or their products. The details of any proposed cooperative arrangement must be first submitted to and approved by the Chief of the Bureau of Animal Industry.

State and Municipal Meat Inspection

The necessity for state and municipal inspection of meat and meat food products should be apparent upon a moment's reflection. Country slaughterhouses and other small institutions which do not do an interstate or foreign business are not subject to Federal inspection but are especially exempted. The sanitary condition may be very unsatisfactory and there is no assurance that diseased animals are not slaughtered. The meat and meat products from abattoirs under Federal inspection are above suspicion from a sanitary standpoint, but the States and municipalities should supervise establishments whose business is entirely within their own confines. This matter is well stated in a recent report by Dr. Melvin, as follows:

"After the Federal Government has gone to so much trouble and expense, as elaborated in the foregoing pages, to provide the citizens of this

and other countries with a wholesome meat supply, it becomes the duty of the housewife and the chef to examine the meat after its receipt from the retail dealer to determine if it is still clean and wholesome, and to keep it so until ready to serve. To their assistance can come the local municipal health inspector, who should see that the markets are kept clean, and that tainted and soiled meats are condemned.

"Indeed, it is hoped that the foregoing description of the operation of the Federal meat-inspection law has shown its limitations and the consequent necessity that it be supplemented by State and municipal inspection. That the inspection of meats is even more necessary at the smaller than at the larger plants of the country is indicated by the comparative results of cattle inspection at these two classes of plants, as shown in the table below. The larger plants had inspection July 1, 1906, and appear in the first column. The smaller plants, coming under the inspection after July 1, appear in the second column. Both classes do an interstate business. It will be seen that relatively twice as many cattle were condemned for tuberculosis at the smaller plants, and nearly twice as many for all causes."

	At establishments having inspection July 1, 1906	At establishments granted inspection after July 1, 1906
Total number inspected	7,203,943	417,774
Total number condemned	25,308	2,625
Per cent. condemned of total inspected	0.35	0.62
Number condemned for tuberculosis	17,168	2,137
Per cent. of total inspected condemned for tuberculosis.	0.25	0.51

More or less effective meat-inspection laws have been passed in Indiana, Minnesota, Colorado, Virginia, Rhode Island, Massachusetts, New York, and Montana. Boston, Detroit, Washington, Montgomery, New Orleans and various other cities have attempted to regulate the sanitary condition of meat within their boundaries. The Montana meat-inspection law is one of the best of its kind. According to this law, every town of more than 5,000 inhabitants is required to establish a meat-inspection service. Public interest in the hygiene of meat is increasing, and the time seems not far off when all large cities at least will provide competent inspection of their meat markets.

CHAPTER X

Educational Requirements for Inspectors

The standard of education, training and skill set up by the Bureau of Animal Industry for entrance into the inspection service is high enough to insure proper qualifications for the different grades of the service. The veterinary inspector occupies a very responsible position and the educational requirements for this position are correspondingly high. The essential points are clearly and succinctly stated in the following quotations from Dr. Melvin's report on "The Federal Meat Inspection Service," and from the regular announcements of the United States Civil Service Commission.

"Whatever weight should be given to a high standard in the personnel of the inspection force must also be allowed. The Bureau's employees are both capable and expert. The men in charge of all stations where slaughtering is done, and the men who do the post-mortem work at all stations, are veterinarians. These men must first have successfully completed a three years' course in veterinary medicine at a reputable veterinary college. The Department recognizes only 14 such institutions, excluding several so-called colleges that aspire to cover this field of knowledge. The Civil Service Commission examines these graduates, and about 50 per cent of those examined make the required grade of 70.

"For the relief of those who think that everything necessary to the appointment of a man in this service is a letter written to the Secretary of Agriculture by an influential citizen, it may be stated that the Department makes absolutely no permanent appointments except of men whose names are certified to it by the Civil Service Commission. During a period of six months one so appointed is on probation, and if he fails to measure up to the requirements he is dropped. If at the end of this six months he attains his absolute appointment, he is not at once freed of supervision and clothed with full authority to pass or condemn. The force is large, and he is so placed on it under experienced inspectors that he may learn the law and regulations and the methods of their application. A set of rules, supplemented, of course, by some necessary discretion on the part of the heads of the service, govern his advancement in

authority and salary. On the latter men rests the burden of inspection. The Bureau holds them responsible, and they well understand that their promotion depends on efficient and faithful service. They have ample opportunity to become experts in detecting diseased animals, and they do. The Department demands all their time during the working day, and a man must be dull indeed if in the days, months, and years spent amid the swift work of the killing floors he fails to develop a most masterly dexterity in discovering abnormalities in the carcasses that come before him.

"The laboratory inspectors constitute another class of employees. They also are selected through civil-service examination in the principles of bacteriology and chemistry, with special application to meats.

"A third grade of employee is the inspector's assistant. Being under the direction of the veterinarian, he is not required to be himself regularly educated along this line. He examines live stock, tags animals, stamps carcasses, seals cars, patrols the houses at night, superintends the removal and tanking of condemned carcasses—in short, he does everything he can, where expert pathological knowledge is unnecessary, to relieve and assist the veterinarian.

"The meat inspector is a fourth class. He is expert in pickling, salting, smoking, and otherwise curing meat. He likewise enters the service through the civil service examinations, and his previous experience is taken into account in grading him. By means of the educated senses of sight and smell he can tell when a piece of meat is unfit, and he knows whether it is irretrievably bad or whether it can be utilized. This class of employees condemned 14,000,000 pounds of meat in the fiscal year 1906-7.

"The Bureau selects certain of the most experienced veterinary inspectors and meat inspectors, divides the country into districts, and sends these men traveling through them, visiting every station and every plant. Their visits are unannounced, and they submit reports with recommendations to the Washington office. They are able, out of their wider experience, to instruct the inspectors in charge at the various stations, and their reports are of great value to the Department in its efforts to secure a uniform inspection and to learn of insanitary conditions and have them corrected."

CIVIL SERVICE ANNOUNCEMENTS

Veterinary Inspector

Bureau of Animal Industry, Department of Agriculture

It will be noted that the entrance salary of this position has been increased to $1,400 per annum, promotion to $1,600 to be made after two years' satisfactory service at $1,400, and promotion to $1,800 after satisfactory service for two years at $1,600 per annum.

The examination will consist of the subjects mentioned below, weighted as indicated:

Subjects.	*Weights.*
1. Spelling (twenty words of average difficulty in common use)	5
2. Arithmetic (simple tests in addition, subtraction, multiplication, and division of whole numbers, common and decimal fractions, and United States money)	5
3. Letter-writing (a letter of not less than 125 words on some subject of general interest. Competitors may select either of two subjects given)	5
4. Penmanship (the handwriting of the competitor in the subject of copying from plain copy will be considered with special reference to the elements of legibility, rapidity, neatness, general appearance, etc.)	5
5. Copying from plain copy (a simple test in copying accurately a few printed lines in the competitor's handwriting)	5
6. Veterinary anatomy and physiology	15
7. Veterinary pathology and meat inspection	30
8. Theory and practice of veterinary medicine	30
Total	100

The last three subjects include general questions on anatomy and physiology, a consideration of the pathology of diseases in general, and such special pathology as is characteristic in the diseases common to food-producing animals. The symptoms, diagnosis, and treatment of diseases incident to domesticated animals will be considered.

A competitor who fails to attain an average percentage of at least 70 in the sixth, seventh, and eighth subjects will not be eligible for appointment, and the remaining subjects will not be rated.

Seven hours will be allowed for the examination.

Age limit, 21 years or over on the date of the examination.

Applicants must be graduates of veterinary colleges. Those graduating prior to or during 1897 will be admitted if from colleges having a course of not less than two years in veterinary science; applicants graduating since that time must be from colleges having a course of not less than three years and must have taken the whole course or its equivalent, and at least two years must have been spent in the study of veterinary science in such colleges. These facts must be shown in the application.

This examination is open to all citizens of the United States who comply with the requirements.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply either to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at any place mentioned in the list printed hereon, for application Form 1312. No application will be accepted unless properly executed and filed with the Commission at Washington. In applying for this examination the exact title as given at the head of this announcement should be used in the application.

As examination papers are shipped direct from the Commission to the places of examination, it is necessary that applications be received in ample time to arrange for the examination desired at the place indicated by the applicant. The Commission will therefore arrange to examine

any applicant whose application is received in time to permit the shipment of the necessary papers.

Meat Inspector

Bureau of Animal Industry, Department of Agriculture

The examination will consist of the subjects mentioned below, weighted as indicated:

Subjects.	*Weights.*
1. Spelling (twenty words of average difficulty in common use)	4
2. Arithmetic (simple tests in addition, subtraction, multiplication, and division of whole numbers, in common and decimal fractions, and United States money)	5
3. Letter-writing (a letter of not less than 125 words on some subject of general interest. Competitors may select either of two subjects given).	1
4. Penmanship (the handwriting of the competitor in the subject of copying from plain copy will be considered with special reference to the elements of legibility, rapidity, neatness, general appearance, etc.)	4
5. Copying from plain copy (a simple test in copying accurately a few printed lines in the competitor's handwriting)	1
6. Practical questions	55
7. Experience (rated on application Form 1093)	30
Total	100

Applications will be accepted only from persons who have had not less than *five* years' experience in curing, packing, or canning meats, and who by reason of their experience in canning rooms, dry salt or sweet pickle cellars, sausage, lard, oleo, butterine, or beef extract departments are competent to inspect meats and meat food products as to their soundness, healthfulness, and fitness for food.

Persons who have not had the required experience should not apply for this examination, as their applications will be canceled.

Persons whose experience has been confined to weighing, scaling, or clerical work, or who have been engaged solely in the occupation of meat cutter or butcher, will not be admitted to this examination.

In answering question 12 in Form 1093 the following facts are required:

State in detail your experience in the different departments of the curing, packing, or canning business, giving the names of your employers, the time employed in each department, and any other information tending to show your fitness for the position of meat inspector. (It is very important that this statement should be accurate and complete.) If more space is required, use blank paper, numbering your answers to correspond with the number of this question.

Age limit, 21 to 55 years on the date of the examination.

This examination is open to all male citizens of the United States who comply with the requirements.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply either to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at any place mentioned in the list printed hereon, for application Form 1093. No application will be accepted unless properly executed and filed with the Commission at Washington. In applying for this examination the exact title as given at the head of this announcement should be used in the application.

As examination papers are shipped direct from the Commission to the places of examination, it is necessary that applications be received in ample time to arrange for the examination desired at the place indicated by the applicant. The Commission will therefore arrange to examine any applicant whose application is received in time to permit the shipment of the necessary papers.

Regulations Governing Entrance to the Veterinary Inspector Examination

By and with the consent and approval of the United States Civil Service Commission, the following regulations are hereby promulgated with reference to the matriculation examination and course of instruction in veterinary science at veterinary schools and colleges required to educate and qualify persons for the civil-service examination for the position of veterinary inspector in the United States Department of Agriculture, Bureau of Animal Industry. These regulations also include a list of the schools and colleges at present accredited and qualified to supply the graduates eligible to enter the above-mentioned civil-service examination.

It is distinctly to be understood that no power to direct or control the work of the veterinary schools or colleges is claimed by the Civil Service Commission or by the Department of Agriculture. The regulations which follow merely indicate what are the requirements of the Government as to veterinary schools and colleges whose graduates are admitted to examinations for veterinary inspectors in the Bureau of Animal Industry.

REGULATION I.—Matriculation

1. A matriculation examination shall be adopted by each veterinary college, the minimum requirements of which shall be equivalent to the second-grade examination as published in the United States Civil Service Manual of Examinations, supplemented by United States history and geography of the United States and its possessions. Such examination will therefore comprise:

1. Spelling.
2. Arithmetic.
3. Letter writing.
4. Penmanship.
5. Copying from plain copy.
6. United States history.
7. Geography of the United States and its possessions.

2. An applicant having a diploma from a recognized college or a normal or high school shall be eligible for admission to a veterinary college without examination.

REGULATION II.—Dates of Holding Matriculation Examinations

The entrance examination shall be conducted on one or more specifically advertised dates under the supervision of the dean, director, or, in the case of State institutions, by the official examining board. The last entrance examination shall be held not later than fifteen days subsequent to the advertised annual opening of the college year, and no time credit shall be allowed to students admitted after that date.

REGULATION III.—Filing of Matriculation Examination Papers

The questions and answers of both successful and unsuccessful applicants shall be kept on file by the institution for at least five years subsequent to the examination of the applicants.

REGULATION IV.—Grading of Matriculation Examination Papers

Applicants shall be graded upon a basis of 100 per cent., and a grade of not less than 70 per cent. shall qualify for admission.

REGULATION V.—Certificate of Matriculation Examination

Any person applying for admittance to the freshman class or for advanced standing in a veterinary college shall present before being enrolled a certificate showing that he has passed the matriculation examination required by these regulations, and in no case shall he be admitted without such certificate.

REGULATION VI.—Subjects Constituting Course of Instruction

The appended list of subjects shall constitute the course of instruction required as a minimum for veterinary colleges. Those numerically indicated shall be known as the major subjects, and those designated by letters shall be under the direction of the professors in charge of the allied major subjects.

1. Anatomy:
   (a) Histology (veterinary).
   (b) Zoology (veterinary).
   (c) Embryology.
2. Physiology:
   (a) Principles of nutrition.
   (b) Hygiene.
   (c) Animal locomotion.
3. Zootechnics:
   (a) Breeds and breeding.

(b) Judging.
(c) Feeds and feeding.
(d) Dairy inspection.
(e) Jurisprudence.

4. Chemistry:
   (a) Elementary physics.
   (b) Physiological chemistry—analysis of milk, urine, etc.
5. Materia medica:
   (a) Botany (medical).
   (b) Pharmacy.
   (c) Toxicology.
6. Pathology:
   (a) Bacteriology.
   (b) Parasitology.
   (c) Post-mortem examination.
   (d) Meat inspection.
   (e) Laboratory diagnosis.
7. Practice of comparative medicine:
   (a) Diagnostic methods and clinics.
   (b) Therapeutics.
   (c) Control of infective diseases.
8. Surgery:
   (a) Surgical diagnosis and clinics.
   (b) Surgical restraint.
   (c) Soundness.
   (d) Lameness.
   (e) Shoeing and balancing.
   (f) Dentistry.
   (g) Obstetrics.

REGULATION VII.—Length of Course

The course of instruction when given during the day shall cover a period of three years of not less than six and one-half months in each year, exclusive of final examinations and holidays; and this course of instruction shall have as a minimum 150 days of actual teaching in each year and a minimum of 3,000 actual teaching hours for the entire three years. The course of instruction when given at night (after 6 p. m.) shall cover a period of three years of not less than eight and one-half months in each year, exclusive of final examinations and holidays. Such course of night instruction shall have as a minimum 200 days of actual teaching in each year, and a minimum of 3,000 actual teaching hours for the entire three years, including at least 150 hours of practical clinical instruction, which shall be given in the daytime.

REGULATION VIII.—Minimum Number of Hours in Course

Anatomy, major subject:		
Lectures	200	
Laboratory	300	
		500
Histology—		
Lectures	40	
Laboratory	100	
		140

Embryology—		
Lectures	10	
Laboratory	20	
		30
Zoology—		
Lectures	20	
Laboratory	20	
		40
Total for subject		710
Physiology, major subject:		
Lectures	80	
Laboratory	20	
		100
Principles of nutrition	10	
Hygiene	10	
Animal locomotion	5	
		25
Total for subject		125
Zootechnics, major subject:		
Breeds and breeding		30
Judging		30
Feeds and feeding		30
Dairy inspection		10
Jurisprudence		10
Total for subject		110
Chemistry, major subject:		
Lectures	50	
Laboratory	150	
		200
Physics (elementary)		20
Physiological chemistry—		
Urine analysis	10	
Milk analysis	10	
		20
Total for subject		240
Materia medica, major subject:		
Lectures		70
Pharmacy, lectures, and laboratory		50
Botany		30
Toxicology		10
Total for subject		160
Pathology, major subject:		
Lectures	40	
Laboratory	100	
		140
Bacteriology—		
Lectures	20	
Laboratory	90	
		110

Parasitology—		
Lectures	50	
Laboratory	10	
		60
Post-mortem examination		10
Meat inspection		50
Laboratory diagnosis		50
Total for subject		420
Practice of comparative medicine, major subject:		
Lectures		250
Diagnostic methods and clinics		300
Therapeutics		100
Control of infective diseases		25
Total for subject		675
Surgery, major subject:		
Lectures	100	
Surgical exercises	80	
		180
Surgical diagnosis and clinics		200
Surgical restraint		30
Soundness		20
Lameness		50
Shoeing and balancing		10
Dentistry (lectures)		20
Obstetrics		50
Total for subject		560

Recapitulation.

Total hours for anatomy group	710
Total hours for physiology group	125
Total hours for zootechnics group	110
Total hours for chemistry group	240
Total hours for materia medica group	160
Total hours for pathology group	420
Total hours for practice of comparative medicine group	675
Total hours for surgery group	560
Total hours, three-year course	3,000

REGULATION IX.—Transfer of Time from One Subject to Another of Same Group

An elasticity may be allowed in the apportionment of the time to the different subjects (or their divisions) under each group to the extent that not more than 25 per cent. may be omitted from the time of any one subject, providing this deducted time be added to some other subject or subjects in the same group.

REGULATION X.—Grading of Course

The course shall be graded in such manner as to avoid unnecessary repetition of lectures or instruction to the same student. For example,

a student, while freshman, should be required to complete a definitely outlined course in such subjects as anatomy, histology, chemistry, etc. When advanced to the junior class he should either drop the studies of his freshman year and take up new work, or he may continue the same subject; for example, anatomy, along advanced lines of instruction.

REGULATION XI.—Number of Veterinarians.

On the faculty of every veterinary college there shall be at least five graduate veterinarians from accredited veterinary colleges teaching major subjects, each of whom shall have had not less than one year's additional training in some accredited veterinary college or three years' experience in teaching or in practicing veterinary science subsequent to graduation from an accredited veterinary college.

REGULATION XII.—Qualifications of Teaching Veterinarians

Not more than three of the five veterinarians in charge of major subjects on each college faculty shall be graduates of any one veterinary college, unless they have had at least one year's additional training in another accredited veterinary college.

REGULATION XIII.—Subjects Taught by Veterinarians

The five veterinarians on the faculty of each veterinary college shall have charge of the following major subjects: (1) Anatomy; (2) Practice of Comparative Medicine; (3) Surgery, and any two of the following three subjects: Pathology, Materia Medica, and Physiology.

REGULATION XIV.—Evidence of Attendance

At the end of the college year each student is entitled to and shall receive a written statement giving the length of time spent in each study during the session and the grade received therein. This statement, or definite evidence of credit, shall be exacted from a student before he is given advanced standing in any veterinary college.

REGULATION XV.—Transfer of Students

A student transferring from one accredited veterinary college to another accredited veterinary college shall be given credit only for such time and courses (lectures and laboratory) as he has successfully completed in the institution previously attended. No one of the colleges herein enumerated shall give credit to any student for any work done at colleges not included in this list.

REGULATION XVI.—Applicants from Colleges not Veterinary

1. An applicant who has successfully completed at least two years' work in a reputable college of human medicine, dentistry, pharmacy, or

agriculture, and who brings an official and explicit certificate describing his course of study and scholarship, and also a certificate of honorable dismissal, shall not be admitted to advanced classes or standing in a veterinary college except as otherwise provided in section 2 of this regulation, but may be given credit for such subjects as have been successfully completed in such colleges if, in the subjects for which credit is sought, said colleges maintain a standard of instruction similar and equal to the minimum standard or requirements established by these regulations.

2. An Applicant from a State agricultural college having upon its faculty one or more graduate veterinarians giving a special course in veterinary science may be given a time credit of one year, providing he has a certificate from the college authorities that he has successfully completed at least 1,200 hours in studies as follows:

Anatomy:		
Lectures	200	
Laboratory	300	
		500
Histology:		
Lectures	40	
Laboratory	100	
		140
Embryology:		
Lectures	10	
Laboratory	20	
		30
Zoology:		
Lectures	20	
Laboratory	20	
		40
Physiology:		
Lectures	80	
Laboratory	20	
Principles of nutrition	10	
Hygiene	10	
Animal locomotion	5	
		125
Zootechnics:		
Breeds and breeding	30	
Judging	30	
Feeds and feeding	30	
Dairy inspection	10	
		100
Chemistry:		
Lectures	50	
Laboratory	150	
Physics (elementary)	20	
Milk analysis	10	
		230
Botany		35
Total hours preveterinary course		1,200

REGULATION XVII.—Agricultural and Medical College Graduates

1. A graduate of the regular four-year agricultural course in an agricultural college having upon its faculty a qualified veterinarian giving a regular course of instruction in veterinary science may be given a time credit of one year, but this credit shall apply only to such subjects as he has successfully completed, provided the course of instruction in said agricultural college, in the subjects for which credit is sought, is similar and equal to the minimum standard of requirements in the course indicated in these regulations.

2. A graduate of a reputable college of human medicine on presentation of a diploma from such college may be given a time credit of one year, but this credit shall apply only to such subjects as he has successfully passed, provided the course of instruction in said medical college in the subjects for which credit is sought is similar and equal to the minimum standard of requirements in the course indicated in these regulations.

REGULATION XVIII.—One Graduation Period Only

No veterinary college shall have more than one graduation period yearly, nor shall diplomas be issued except at the close of the regular college year.

REGULATION XIX.—Requirements for Graduation

1. A candidate for graduation shall have attained the age of 21 years and attended three full college years in a veterinary college herein recognized (except as otherwise provided in Regulations XVI and XVII); the last year of attendance must have been at the college to which he applies for graduation.

2. He must have successfully completed the course of study and passed all the final examinations in the subjects indicated in these regulations.

3. If he fails to pass satisfactorily in subjects representing in time 25 per cent or more of his senior year, these subjects must again be taken in full with a succeeding class before he can be graduated.

REGULATION XX.—Information for Department of Agriculture

1. All veterinary colleges shall promptly furnish to the Department of Agriculture a copy of their annual announcements and of all other publications relative to the courses of instruction offered.

2. They shall also furnish: (1) Not later than twenty days after the opening of the first session of each college year, a complete list of their matriculates by classes; and (2) within ten days after the close of the college year, a complete list of the last graduating class.

REGULATION XXI.—Eligibility for United States Civil-Service Examination

Graduates of the accredited veterinary colleges herein listed shall be eligible at all times for the United States civil-service examination for employment as veterinary inspectors in the Bureau of Animal Industry, subject to the other requirements of the civil-service rules as to fitness, etc.

REGULATION XXII.—Not Eligible to Civil Service

Hereafter no undergraduate or other person who has not received a diploma from an accredited veterinary college shall be permitted to take the civil-service examination for the position of veterinary inspector.

REGULATION XXIII.—Supervision of Veterinary Colleges

The Department of Agriculture shall maintain such supervision of the work of the veterinary colleges as shall enable it to secure the requisite information to determine whether such colleges are faithfully complying with the minimum standard of requirements indicated in these regulations.

REGULATION XXIV.—List of Accredited Veterinary Colleges

The following list of institutions is approved in lieu of the one previously in force. There will be added thereto, as occasion may arise, upon recommendation of the Department of Agriculture or upon proof made to the Civil Service Commission that any school or college has qualified as provided in these regulations for eligibility, any other veterinary schools or colleges whose courses of study are found to be satisfactory to the Department or to the Commission according to the standards herein established.*a*

Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College of Agriculture and the Mechanic Arts, Veterinary Department.
Indiana Veterinary College.
Iowa State College, Veterinary Department.
Kansas City Veterinary College.
Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
New York-American Veterinary College.
New York State Veterinary College.
Ohio State University, College of Veterinary Medicine.
San Francisco Veterinary College.

a The colleges are arranged in alphabetical order.

State College of Washington, Veterinary Department.
United States College of Veterinary Surgeons.
University of Pennsylvania, Veterinary Department.

The Grand Rapids Veterinary College is excluded until it complies with these regulations, except as follows: Those graduates who have studied veterinary science at this college for three years may be admitted to examinations.

The Ontario Veterinary College is excluded until it complies with these regulations, except as follows: Those graduated during or prior to 1897 may be admitted to examinations.

Graduates of the following-named colleges, which are not now in session, will be admitted to examinations:

Columbian University, Veterinary School, Washington, D. C.
Harvard University, School of Veterinary Medicine, Boston, Mass.
McGill University, Veterinary Department, Montreal, Canada.
National Veterinary College, Washington, D. C.

Graduates of the following-named foreign colleges will be admitted to examinations:

Glasgow Veterinary College, Glasgow, Scotland.
Royal Veterinary College, London, England.
Royal Veterinary College of Ireland, Dublin, Ireland.
Royal (Dick) Veterinary College, Edinburgh, Scotland.
The New Veterinary College, Liverpool, England.
Veterinary College of Lemberg, Austria.

The initial salary for meat inspectors is $1,000 per year. Persons who are qualified for either of these positions, and who wish to enter the inspection service, should address a request to the Civil Service Commission, Washington, D. C., for information regarding times and places for holding examinations. At times there are not enough applicants to fill the vacancies, and those who pass the veterinary inspector examination are almost certain to receive an appointment if their personal qualifications are satisfactory. The work of the inspector is arduous and requires great skill and tact, but the prospects for the industrious and conscientious man are always good.

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